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DEPARTMENT OF AGRICULTURE AND COMMERCE
OFFICE OF THE SECRETARY
MANILA

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DEPARTMENT OF AGRICULTURE
AND COMMERCE

FOR THE FISCAL YEAR ENDING
DECEMBER 31, 1933



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ANNUAL REPORT OF THE DEPARTMENT OF AGRICULTURE AND COMMERCE

February 28, 1934

His Excellency,
The GOVERNOR-GENERAL OF THE PHILIPPINE ISLANDS,
Manila.

SIR: In accordance with the provision of section 91 of the Administrative Code, I have the honor to submit the following report of the Department of Agriculture and Commerce for the year 1933:

I. DEPARTMENTAL ACTIVITIES

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Charged by law with the administration and development of agriculture, commerce, the industries, and the natural resources of the country in general, the Department of Agriculture and Commerce functions through the Bureau of Plant Industry, Bureau of Animal Industry, Bureau of Forestry, Bureau of Lands, Bureau of Commerce, Bureau of Science, Weather Bureau, Fish and Game Administration, Division of Mineral Resources, Fiber Inspection Service, Division of Home Economics, Division of Navigation, Division of Accounts and Property, Division of Statistics, Scientific Library Division, Division of Publications, Veterinary Examining Board, Board of Examiners for Surveyors, and the Office of the Secretary. The independent divisions under the Department are the result of the reorganization of the Department in accordance with the provisions of Act No. 4007. Four of these divisions—Accounts and Property, Statistics, Scientific Library, and Publications—perform general service for the Department, while the rest carry out functional activities. The two boards are appointed under the law by the Secretary of Agriculture and Commerce.

The functions of the Department, for the purpose of this report, are divided into extension work, research work, control of pests and diseases, and public service in general.

A. EXTENSION WORK

1. BUREAU OF PLANT INDUSTRY

General statement.—The work of promoting agriculture is entrusted to the Bureau of Plant Industry, which resorts to

diverse means to bring home to the farmers the results of investigations and advances in agriculture. To this end it maintains an extension service, conducts farmer's conventions, holds lectures, organizes demonstrations, and directs special campaigns. Consultations with, and investigations by, agronomists are encouraged. The diversification of crops, an important activity in connection with the promotion of agriculture, involves the introduction of Bermuda onions, cotton, aromatic cigarette tobacco, and such crops as economic exigencies demand. Commercial orchard planting is stimulated with a view to fostering economy in the home. The relief work undertaken by the Department through the Bureau of Plant Industry, consists in the free distribution of seeds and planting materials to farmers rendered destitute by calamities. Rural improvement work to ameliorate the lot of small farmers is an important undertaking specially in the rice-producing provinces where the depressed condition of the rice market may breed discontent and even lawlessness. The utilization of the by-products of the industries, particularly those threatened by discrimination or adverse legislation abroad, is attended to with zeal in the hope that local utilization will offset such untoward circumstances.

Agricultural situation.—The agricultural situation has undergone little change from that of last year, with the exception of the upward trend of the sales of staple crops induced by a general recovery throughout the world and an improvement in financial conditions. Changes for the better are noted in the adoption of diversification crops.

Information given out.—A total of 174,363 farmers were given information through letters and direct consultations at the Central Office of the Bureau of Plant Industry at Manila and at the Offices of the district and provincial agronomists; by visiting farms, orchards and gardens; and by giving lectures to schools and at farmers' conferences. A total of 10,802 investigations were made for farmers to determine what crops could be profitably grown in their respective localities in lieu of the old staples which now command very low prices.

Agricultural exhibits.—The Second Horticultural Show was held in connection with the 1933 Manila Carnival, and had an attendance of 50,617 as compared with the 48,112 of the First Horticultural Show in 1932, showing increased interest of the public in agriculture.

The agriculture exhibits in the Second Floating Exposition of the Bureau of Commerce proved to be an effective means of demonstration. It was estimated that around 4,000 people saw our exhibits in the different ports of call. Plant materials, such as grafted, budded and marcotted mango, lanzon, citrus, chico, avocado, breadfruit, grapes, etc., vegetable seeds, rice flour and farmers' pickles, were all in great demand.

During the year more requests for participation in the provincial and municipal fairs were received than could be attended to. We took part in sixteen municipal and provincial fairs, which were held in different provinces of Luzon, Visayas, and Mindanao. It is estimated that approximately 113,210 individuals attended these fairs. The materials for these exhibits were prepared and presented to show among other things the use of high yielding varieties, the application of good farm practices, and the control of pests and diseases.

Aside from participation in these fairs, the extension vans visited 10 other provinces, covered 69 municipalities, and gave demonstration to about 25,800 people. These vans have built-in exhibit shelves and enough inside room for carrying boxes of materials, and can carry four to six demonstrators. Each van is equipped with a radio and projection material for screening proper methods of farm operations.

Onion drive.—Encouraged by the success of the onion growing campaign in Batangas, Laguna, Zambales, Bulacan, and Nueva Ecija, this year's onion drive was undertaken on a much larger scale than the previous one. In last year's campaign only 13 provinces planted the crop, which number has been increased to 33 provinces this year.

Considering the newness of the crop, and the lack of Bureau personnel for the close supervision of individual coöperators who are widely scattered, the results so far obtained may be considered encouraging. This year's crop covers an area of about 300 hectares, scattered in 33 provinces, with some 900 kilos of seeds distributed to 527 coöperators. As the planting season is not yet closed, the hectarage may go above the foregoing figure.

Cotton drive.—In the 1932-1933 crop, a total of 35 provinces covering 92 municipalities and 347 coöperators made trial plantings. The area planted was approximately 497.7 hectares under 347 coöperators, who planted 3,837.62 kilos of seeds. The es-

timated total crop harvested was 3,913.8 kilos, including floss and seeds. Of the 92 municipalities that tried this crop, 64 failed and 28 succeeded. The planting in new areas outside the cotton provinces was not very successful due to its tardiness, having been made after harvesting the rice crop, and lack of familiarity on the part of the farmers with the requirements of the cotton plant.

The 1933-1934 crop, planted toward the last part of the year, covers an area of 357 hectares, and 3,061 kilos of seeds were planted by 382 coöperators in 26 provinces. Planting has been started early, and a better stand of the cotton plant is now evident in the fields.

Rural improvement work.—Realizing the need for rendering direct help to small farmers, particularly the aparceros in the rice districts, the Department of Agriculture and Commerce through the Bureau of Plant Industry has shown special interest in improving their condition. In 1932, during the administration of Governor-General Roosevelt, in an attempt to ameliorate the condition of the rice tenants in the Central Luzon provinces, who because of discontent arising from their pitiful situation resulting from the depressed state of the rice market, were easily being involved in the activities of professional agitators, the Department rendered support to a rural improvement campaign by distributing free seeds and planting materials to the needy. After the secondary crop season of that year was over the Bureau of Plant Industry immediately took steps to perfect its plans for general rural improvement work. The Bureau, following several years' experience in the field, finally adopted an aparcero plan which was carried out at the ensuing drive beginning September. About that time the Governor-General appointed a Rural Improvement Committee to take up the work of ameliorating the small farmers' lot in those areas that were rich grounds for communistic agitation. The Governor-General's committee to which full coöperation was tendered by the Bureau of Plant Industry, adopted the aparcero lot plan that was previously approved and undertook the carrying out of the first trials. These were conducted in two municipalities. One unit was established at San Miguel, Bulacan, and the other in Gapan, Nueva Ecija. The Gapan unit was in charge of the personnel of the Bureau of Plant Industry, and 138 farmers were helped in improving their home lots. The San Miguel unit had 96 farmers who were handled by assistant agronomists

of the American Red Cross. The total number of farmers helped in the two provinces was therefore 234. The Bureau of Plant Industry distributed to all of them free of charge the following planting materials:

1. To the San Miguel Unit—	Packets.
(a) Total vegetable seeds distributed	850
(b) Total number of varieties of vegetable seeds distributed...	18
(c) Hawaiian pineapple suckers distributed.....	500
2. To the Gapan Unit—	
(a) Total vegetable seeds distributed.....	450
(b) Total number of varieties of vegetable seeds and $\frac{1}{2}$ kilo of Bermuda onions distributed.....	6
(c) Hawaiian pineapple suckers distributed.....	300
(d) Caimito seedlings	24

In order to help maintain interest in the improvement of the *aparceros*' lot, a practical guide written in Tagalog by the chief of the Agricultural Extension Division was issued by the committee of the Governor-General in the form of a bulletin. Aside from the improvement of home lots, interest has continuously been created in the planting of secondary crops which could bring additional income to the farmers. Any improvement in the standard of living of the farmers must be brought about by increased income from the extra labor devoted to their farms. There has been great demand for information regarding profitable secondary crops which can be grown after the rice crop.

Home and commercial orchard planting.—The interest shown by the people in the development of commercial orchards has increased, and the frequent follow-up service made the field personnel inadequate to give to all the necessary attention. Both the absentee landlord and the stay-out-on-the-farm farmer lack the practical experience in organizing commercial orchards, and considerable attention was required of our extension agents.

Approximately 374,025 plants have been planted under the supervision of the personnel of this Bureau. Besides this number, there have been placed in coöperators' nurseries in the provinces and in Manila over 84,520 seedlings of different fruit trees. Some 78,263 trees were manured, fertilized, cultivated and mulched under bureau supervision. Other planting materials distributed to farmers during the year were 12,418 kilos of seeds, 379,919 plants, 195,145 cuttings, and 13,817 budsticks.

For the improvement of trees in the orchard, 58,268 trees were pruned, 11,500 trees grafted, 9,924 trees budded, 6,809 trees marcotted, and 48,497 trees treated for pests and diseases under

our supervision. In brief, the help given to farmers consisted mostly in advice on the kind of fruit trees that are to be grown, the methods of planting and subsequent care, demonstration of budding, grafting, and marcotting work, spraying for the control of pests and diseases, and helping to secure plant materials for orchards, besides help in encouraging people to raise vegetables.

The lack of planting materials, particularly grafted and budded plants, is a great handicap to the speedy extension of commercial orchards. In the absence of commercial private nurseries the Government is practically the only agency to provide these materials.

In localities where the soil is underlaid by adobe rock, or with subsoil of very hard clay, it has been found that the use of dynamite for opening the holes and loosening the soil for the adequate growth of the root system of fruit trees, has an increasing demand. Because it is impossible for every one to secure and use dynamite, the service of blasting the soil for demonstration purposes to farmers has been continued. During the year 1,358 holes were blasted. The farmers were required to pay for the dynamite used on their farms but the service was given free.

Cost of production survey.—Under the committee arrangement inaugurated at the beginning of the year, the assistant chief of the Agricultural Extension Division was placed in charge of the committee to study the cost of production of the principal crops grown in the Philippines. The cost of production survey was started with rice, and before the end of the year sufficient data had been obtained from two rice regions—Bulacan and Nueva Ecija—particularly in those sections with frequent agrarian troubles. At the completion of the work, it is expected that useful information will be gathered which could be utilized in the formulation of government measures for rural improvement which should help in minimizing agrarian upheavals.

Tenancy conditions and cost of producing rice in Bulacan.—The Crop Production Costs Committee found out that no tenant keeps records of his farm business. Absentee landlordism exists throughout. The average daily expense of an individual adult of a tenant family is approximately ₱0.04 for .223 ganta of rice and ₱0.057 for fresh meat, vegetables and other foods. The average standard of living of a tenant measured in money is ₱332.66 and the average income is ₱177.97. The average size

of land worked by a tenant is 2.12 hectares. The low price of palay brought some misery and poverty to the low-earning tenants. To produce a cavan of palay, it costs ₱1.21 of which ₱0.31 is the actual cash expenditure. In other words, the average production per hectare is ₱54.73 of which ₱16.13 is actual cash expenditure, the balance going for labor, depreciation on investment, for animals, tools, implements, etc. The broadcasting method of planting rice is more economical than transplanting by ₱14.04 per hectare. A tenant devotes an average of 945 hours (135.76 days of 7 working hours) to the care of the carabaos throughout the year, and 163.52 hours (23.36 days) to the maintenance of his field.

Farm relief work.—Due to continuous ravages of locusts, particularly in northern Mindanao, there have been requests for relief work in the locust-ridden provinces. For this purpose, seeds of corn, beans, and vegetables, and planting materials of camote, cassava and other short season crops, were distributed free to the suffering farmers. Of the seven varieties of seeds, 10,000 packages were distributed among 750 farmers in the six provinces of northern Mindanao.

2. BUREAU OF ANIMAL INDUSTRY

General statement.—The Bureau of Animal Industry works for the increase of the animal population by improving economic farm animals through scientific methods of breeding. Cattle, horses, and poultry are given special attention in this respect. The activities in animal husbandry include the upgrading of milch cows and goats. By stimulating interest in animal raising, industries like meat packing, dairy, and others dependent on a constant supply of healthy animals, are fostered. As a result of activities in this direction, the Philippines has long been self-sufficient as regards beef supply. No live cattle for beef purposes are now imported, the cattle in ranches in various parts of the country supplying the local market with all the fresh meat that it demands. As a consequence of the attempt to improve the livestock of the country, the Islands are now in a position to industrialize animal products. Another promotional activity on which the Bureau of Animal Industry has embarked, is the introduction of exotic grasses for forage.

Animal population.—The latest figures available, those for 1932, indicate that due to better control of epizootics during the previous year, there was a logical growth in the animal

population of the Philippines. The condition of this population is good, and efforts to improve the herds by scientific method of breeding through upgrading, and the raising of improved purebred economic farm animals have been exerted with gratifying results. The following table shows the animal population and its corresponding value for 1932, as compared with those for 1931:

	1932	Value	1931	Value
Cattle	1,320,980	P32,643,720	1,282,881	P32,350,711
Carabao	2,192,904	72,817,882	2,149,652	83,060,665
Horses	337,669	7,688,431	319,421	10,337,230
Hogs	2,004,620	17,468,585	2,491,245	24,846,865
Sheep	120,476	320,360	111,670	297,064
Goats	423,287	1,064,818	394,967	1,099,389
	6,989,936	P132,003,797	6,748,736	P152,591,924

Animal husbandry.—As a result of the constant campaign to acquaint the public with the activities of the Bureau in animal husbandry, there was a brisk demand last year for Nellore bulls, milch cows and goats, and improved breeds of swine and poultry. While the Bureau was able to fill the demand for Nellore bulls, because of the adequate stock at the Bon̄gabon Stock Farm, it could not fill the orders for dairy animals, especially for goats, as it could not raise such breeds of animals fast enough to satisfy the ever growing demand for them. As a matter of fact, orders for future deliveries were accepted in several instances.

To this general interest in animal raising may be partly attributed the second prosperous year of the Stock Herds and Farms which made profits for the year reach a total of P34,895.10, or P14,532.36 more than the gains of 1932. If the profits obtained last year from the operation of the herds and farms are taken as a criterion, much progress has been attained in the development of our animal industry.

The merits of improved breeds have been instilled in the minds of the public. The constant demand for Nellore bulls by the buying public for breeding purposes is a convincing testimony of the fact that animal raisers of the country, especially the small ranchers, are now convinced that higher profits can be realized from improved breeds of animals. Indeed, the future of our animal industry largely depends on the upgrading of our animals with selected improved purebred sires. This is especially true with horses and dairy animals of occidental origin.

Horse breeding.—During the year there has been observed an unprecedented interest throughout the Islands in horse breed-

ing. Five out of the six Arab stallions imported from Bombay, India, in 1929, have had a very busy season. Requests coming from different provinces are being received by the Bureau to establish breeding stations and to provide, among other things, Arab stallions for stud purposes. There are bright prospects for markets for good horses here and abroad, particularly China, where the need for such horses by the army is almost unlimited.

Dairy animals.—As the milk supply for a country presupposes production on a large scale, it follows that dairy animals must be raised in large numbers to meet the local demand. To solve this problem the Bureau has under way important experiments at the Alabang Stock Farm, from which it may be definitely known which breeds of dairy animals will stand local climatic conditions, live on the pasture of the country, and yield a fairly good quantity of milk on a profitable basis. The animals used for this purpose are the Ayrshires of the West, the Red Scindi of the East, the Anglo-Nubian, and the Toggenburg goats and their grades. Experiment on the upgrading of the Ayrshire was started thirteen years ago, and while nothing definite or conclusive can be stated at this time the results so far obtained are most encouraging.

The Red Scindi is of recent introduction but as it can easily adapt itself to local conditions, it can perhaps be reared here for milk purposes.

Anglo-Nubian and Toggenburg milch goats are being upgraded to supplement the milch cows. These grade milch goats are now in the third generation and it will take two more generations to make them purebred Anglo-Nubians. Whether or not these animals can live on the common pasture of the country has not as yet been fully determined.

Upgrading of the Nellore cattle.—Private breeders are upgrading Nellores for slaughter purposes on a big scale, and it is expected that they can take care of the local demand for beef in the future. In view of their progress in this undertaking, the Bureau is not inclined to continue this line of activity on our farms. Whenever private ranchers and animal raisers show the capacity to take up a certain phase of animal husbandry initiated by the Bureau, it would seem advisable to let such private parties alone in the development of their business.

Experiments on exotic grasses show that several varieties thrive well here while others do not. Among those that thrive

may be mentioned the Yaragua grass, Rhodes grass, Redtop grass, Dallis grass, and Kikuyo grass.

Livestock show.—The Bureau of Animal Industry for the third time participated in the Livestock Show of the 1933 Manila Carnival. The show was put up by the Bureau staff together with representatives of the Colleges of Veterinary Science and Agriculture and the Bureau of Education. The show was as successful and popular as the former ones.

3. BUREAU OF FORESTRY

General statement.—The development of the forest resources, and consequently the promotion of the lumber industry and other allied industries, constitute the main task of the Bureau of Forestry. It gives advice to lumbermen and furnishes aid to the lumber trade. One of the most noteworthy accomplishments of the Bureau in this connection is the popularization of Philippine lumber in the markets of the world. Along with its administrative work the Bureau, through its technical personnel scattered all over the Islands, preaches the conservation of forests and judicious utilization of the same, conducts campaigns against illegal destruction of timberlands by means of the *cainḡin* system, and engages in reforestation work, coöperative planting, industrial investigations, and kindred undertakings. Upon this Bureau also devolves the task of setting aside national parks, forest reserves and forest zones, and communal forests which are of direct material or æsthetic advantages to the people. The administration of pasture lands is likewise entrusted to this Bureau, and in this way it helps, although indirectly, in the development of the country's animal industry.

THE LUMBER INDUSTRY

Lumbering activities.—Lumbering operations were more active this year than in 1932. The total timber cut during the year was 1,085,313 cubic meters as compared with 1,018,909 cubic meters last year, or an increase of 6 per cent. This increase was, however, largely due to increased activities of exporting sawmills.

Investment.—Two new modern lumber plants were put up during the year, besides a number of mills of minor capacities. All told, there were 110 sawmills and machine logging operations in force at the close of 1933 as compared with only 106 in 1932. However, despite this increase in the number of mills, the



total investment in connection therewith declined to ₱27,000,000 as compared with about ₱33,000,000 of last year. This was due to the fact that a few small mills did not renew their licenses during the year and that two fairly large lumber companies were declared insolvent by the courts.

Foreign markets.—The foreign markets for Philippine lumber and timber registered considerable gain during 1933 as compared with last year. There were shipped abroad during the year 71,145,928 board feet (incomplete) of lumber and timber as against 50,628,144 board feet in 1932, or an increase of 40 per cent. The bulk of the shipments went as usual to Japan, the United States, China, Great Britain, and South Africa.

The total value of lumber and timber imports during the year remained practically the same as in 1932. As usual, the principal kinds of products imported were pine and redwood lumber, aspen logs, staves, camphor lumber, box shooks, and plywood. These products are mainly for special purposes, such as cigar shooks, match splints, barrel staves, for which no satisfactory substitutes from local woods have as yet been found.

Some lauans were imported from the British East Indies, but the amount that entered into the Islands during the year was greatly reduced on account of increased import tariff imposed here.

Local markets.—The local markets registered only slight gain as compared with last year but movement of stocks continued. Lumber inventories at the end of the year declined 20 per cent as compared with 1932.

Supervision of logging operations.—The supervision of logging operations was performed in conjunction with the scaling work. As the scalers had to be in the woods at least three days a week for scaling purposes, they could conveniently supervise the logging operations in connection therewith. No fire of any importance occurred during the year in logged-over areas. However, several illegal *cañigins* were detected by forest officers inside concession areas.

Diameter limits were strictly enforced on operators within timberlands and unclassified areas. As the present operators of most of the lumber companies are still in potential agricultural lands which are unclassified, there is a necessity of classifying these lands as soon as possible in order that in those areas that are really suitable for agricultural purposes the enforcement of the diameter limits may be waived so as to utilize as much as possible all the trees growing therein.

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Illegal caiñgins.—Illegal *caiñgins* involving 2,427 cases covering about 2,831.38 hectares of public forest have been detected during the year. The forest products destroyed consisted of 154,032.53 cubic meters of timber; 6,856.60 cubic meters of firewood; 3,000 pieces of boho; and 393 Benguet pine seedlings, with corresponding regular and additional forest charges of ₱251,679.14 as compared with ₱358,330.27 in 1932.

Land classification.—There were handled 353 projects during the year including the 202 pending last year as against 272 projects in 1932. Out of these, 12 projects have been cancelled and 106 have been certified, as against 62 certified in the previous year, leaving 235 projects pending action at the end of the year, distributed as follows: 135 for compilation and preparation of maps, 75 under study, 12 suspended, and 13 returned for additional data.

The 106 projects certified have a total area of 449,602.15 hectares, of which 358,144.15 hectares are alienable and disposable and 91,458.36 hectares are timberland comprised in 142 blocks, as against 142,015.57 hectares in 1932, of which 116,624.38 hectares are alienable and disposable and 25,391.19 hectares are timberland included in 77 blocks.

During the year there was a total of 5,038 individual public lands applications handled as compared with 5,972 in 1932. The following shows the status of those applications as of December 31, 1933:

Final action:

Certified for agriculture.....	657
Certified for forestry	309
Returned without certification for various reasons.....	540

Pending final action:

Applications with reports pending action.....	886
Applications pending inspection and report.....	2,646

Total	5,038
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Forest reserves and special forests.—Three new forest reserves, the Dahican Watershed in Camarines Norte, the Ipil Forest Reserve in Isabela, and the Lal-lo Forest Reserve in Cagayan, containing an area of 43.54, 1,060.94, and 1,249.60 hectares, respectively, were proclaimed during the year. These bring the total number of forest reserves at the end of 1933 to 34 with an aggregate area of 765,619.23 hectares. There were 72 proposed forest reserves with an approximate area of 390,903.39 hectares.

Twenty-one requests for the reservation of portions of the public forest for municipal, provincial, and insular purposes, were received during the year. Of these, eight were examined and acted upon accordingly and the rest are pending examination.

Communal forests.—During the year, 34 parcels of communal forests were established, 55 amended and three cancelled. At the end of the year, 1,639 parcels with an area of 234,506.53 hectares are in force. There were 206 parcels inspected and reported on. The operation of the forestry administrative orders concerning communal forests were suspended. Four parcels were closed to cutting from two to five years while two parcels were opened to commercial exploitation. A total of 40,153.72 cubic meters of timber were utilized during the year from all established communal forests. Out of the 1,217 municipalities and municipal districts, 707 have communal forests. There are 258 parcels pending establishment.

Communal pastures.—Nine parcels containing an area of 2,111.60 hectares were established during the year, making a total of 30 parcels with an aggregate area of 8,299.30 hectares established in 20 municipalities. Seventeen parcels are still pending establishment.

Reforestation.—The seven reforestation projects established under Act No. 3283 were maintained during the year, but due to the very limited funds allotted the activities were reduced and the improvement work hampered. There were 5,090.26 liters and 30,560 seeds sown in the nurseries, and 1,174.70 liters sown directly in the plantations. Those planted in the nurseries produced 619,354 seedlings, but only 182,923 were set out, while 265,019 remained unplanted.

The results obtained from the quinine project in Bukidnon are encouraging. The Government should provide sufficient funds to continue this work.

Coöperative planting.—Coöperative planting was continued during the year. There were planted 7,785 seedlings, 574 cuttings and 454 liters of seeds in Fort William McKinley; 808 seedlings of various trees and ornamentals, in the town plaza and cemetery ground of Biñang, Laguna; and 3,476 seedlings of trees and 8,543 ornamentals, were sent to Mambucal Summer Resort, Occidental Negros. Coöperation was also extended to 12 projects, the most important of which are the Metropolitan Water District, Novaliches, Rizal; Mira-Hill, Vigan, Ilocos Sur; Singson Waterworks, of the same province; Osmeña Waterworks, Cebu, Cebu; and the High School of Laoag, Ilocos Norte.

Extension service.—The Bureau of Forestry participated in the 1933 Philippine Carnival and Exposition in conjunction with the bureaus under the Department of Agriculture and Commerce. In the provinces eight similar participations by the district personnel were made in local fairs and garden days. Coöperation was also extended to the Bureau of Plant Industry's Agricultural Extension Van and the Community Assembly under the Bureau of Education.

Fourteen memorial trees were planted by prominent men during the year. Among those who planted trees may be mentioned department secretaries, directors of bureaus, a famous Spanish writer, and provincial governors.

Plans for low-priced buildings were drawn out during the year to help the small house builders. Four building plans were finished for houses the cost of which ranges from ₱500 to ₱2,500.

Ten addresses were delivered in Manila, eight at the meetings of the Pan-Pacific Science Club, one at the Rotary Club, and one in an Arbor Day celebration in one of the city schools. There were 146 talks on forestry given in the different districts by field personnel of the Bureau of Forestry, and five papers were read at the Agricultural College, Los Baños, Laguna.

4. BUREAU OF COMMERCE

General statement.—The Bureau of Commerce is the trade promotion office of the Government. It gives practical aid to Philippine manufacturers and producers in marketing their goods, an endeavor that gives life and permanence to a campaign to increase the consumption and widen the markets for made-in-the-Philippines products. This campaign is consummated through a series of demonstrations which includes floating and caravan expositions, participations in provincial and municipal fairs, and the management of trading centers and exchanges. As part of its trade promotion progress, the Bureau helps in the organization of local trade associations, stimulates local trade in stock securities, handles the sale of native products upon request by private parties, fosters retail trade, and releases all sorts of commercial information for the benefit of businessmen and the public in general. The extension of financial aid to agricultural producers is another important activity of the Bureau. Major industries, like tobacco, copra, and rice, are helped in this manner. The organization of coöperative marketing associations and the handling and disposal of agricultural

products for these associations are functions that promote the economic welfare of the country.

Trade promotion.—The Bureau of Commerce sold for various parties, through the Produce Department of the Manila Trading Center and Exchange, a total of approximately ₱100,000 worth of native products, such as rice, sugar, leaf tobacco, corn, mongo, and tiki-tiki, and occasional shipments of peanuts, coffee, and tomatoes.

It released a total of 47,250 copies of daily market reports for Manila, giving detailed information on prices, market conditions, probable trends of business, quotations, and market conditions in foreign markets, etc.; the same number of copies of reports on retail quotations on foodstuffs sold in the public markets; 17,500 copies of weekly trade reviews, which describe the movement in the market of the major products; and several hundred monthly trade reviews which summarize conditions during the entire month in regard to the principal native staples. These copies were sent to numerous subscribers that had paid for postage stamps for mailing, and to local newspapers that gave them wide publicity in their columns. As customary, two radio broadcasting stations in the city broadcast the market reports every night.

It organized a convention of Filipino retail merchants from different parts of the Islands during the Carnival season in 1933. The convention which lasted for one week was attended by many Filipino businessmen. Several prominent Filipino businessmen addressed the convention.

The Bureau assisted the Samahang Filipino ng Tindahan Sari-sari, an association of Filipino retail merchants in the city, in setting up in the Commercial and Industrial Fair of the 1933 Carnival, a model "sari-sari" store as a means of educating the public on the technique of establishing such a store.

It published an illustrated folder entitled "How to Start and Manage a Sari-Sari Store," describing how a modest but fairly well-equipped *sari-sari* store could be started with a capital of ₱300; the means of keeping the store attractive to customers, etc. Ten thousand copies of this pamphlet were printed in English and in local dialects, and have been widely distributed.

It aided the growth of the local trade in stock securities by giving correct information, through wide publicity in the local press, on the daily, weekly, and monthly transactions on stocks and bonds in the three stock exchanges in the city.

It published *The Philippine Journal of Commerce* once a month, having for its features live topics of business and industry, new researches of the Bureau on the different industries with bright prospects of development, a monthly review of Philippine trade, a trade information section, a list of new business corporations, a list of newly registered trade-marks, business indicators both in figures and graphs, a tariff information section, a graph giving indices of Philippine business conditions, provincial trade notes, etc. At the end of the year the *Journal* had a total circulation of 1,305 copies, a large portion of which went to foreign countries. Two thousand copies were printed every month.

The Bureau answered 3,700 inquiries for trade data and other information, and conducted over 1,000 new trade investigations.

The Bureau gathered foreign tariff publications containing foreign tariff rates and customs regulations for 18 foreign countries, for ready reference by parties interested in the foreign trade of the country. Considerable headway was made in compiling tariff information pertaining to the principal export products of the Philippines. Tariff laws of the following countries were received during the year: Australia, Burma, Belgium, Dutch East Indies, Austria, France, Germany, Great Britain, India, Italy, New Zealand, Norway, Siam, Spain, Switzerland, Turkey, and Czechoslovakia.

The Bureau distributed 6,440 copies of the different pamphlets, leaflets, and mimeographed or typewritten articles on different local industries and business topics during the year, and released, besides, numerous press notes on various business and industrial topics of general interest. Four hundred personal calls, in round numbers, for miscellaneous data and information were further served by the Bureau during the year.

Responding to the need for an official weekly report on hemp arrivals and stocks at Philippine ports, the Bureau arranged to publish such reports beginning July 10, 1933. These reports, based on reports furnished by fiber inspectors in different grading stations in the country, are of great use to hemp exporters and importers of fiber abroad.

No less than 300 firms in Manila and in the provinces were investigated by the agents of the Bureau during the year, in connection with the Bureau's confidential credit rating service.

Industrial promotion.—This Bureau was in charge during the year of the campaign to increase the local consumption of Philippine products. It assumed direct control and management of the operation of the Manila Trading Center and Ex-

change when it was created in August. It also directed the participation in commercial fairs and expositions, both in Manila and in the provinces. Investigations of industrial processes and methods were also made during the year.

Among the most important accomplishments for the promotion of industries during 1933 are the following: management of the Crystal Arcade Exposition held in January, 1933; participation in the 1933 Manila Carnival, second floating exposition, first caravan exposition; participation in provincial and municipal fairs and garden days; opening and management of the Manila Trading Center and Exchange; coöperation with provincial trade promotion associations in the establishment of the trading centers in Cabanatuan and Dagupan; and industrial demonstrations in Lucena, Bacolod, and Iloilo.

The Crystal Arcade Exposition was the first effort made to bring together under one roof the diverse manufactures and industrial products of the Islands. Local manufacturers in Manila and in the provinces were invited to take part in the exposition, and they responded enthusiastically to the call. As a result, a representative national display of the best industrial articles being manufactured locally was made. The attendance at the exposition was most encouraging, for the entire period that it remained open to the public. Besides the inaugural program which was attended by leading Government officials and businessmen, including Governor-General and Mrs. Theodore Roosevelt, and members of the Philippine Legislature, several other programs were held during the exposition while it lasted. These served to keep alive the interest of the public in the exposition.

The total sales at the exposition reached ₱30,000. An essay contest was held in connection with the exposition in order to attract the interest of the students in the high schools all over the Islands to the purposes and aims of the national display of Philippine-made goods. More than 100 essays were submitted.

In the participation of the Bureau in the Manila Carnival of 1933, the former policy of merely exhibiting the goods was changed to that of actually selling articles placed on exhibit. The Bureau's exhibition was divided into three units: (a) commercial unit, (b) industrial demonstration showing the direct coconut-oil extraction and coir defiberization, and (c) a model sari-sari store in operation. The exhibits were well attended and patronized by carnival visitors.

The demonstration of industrial processes was continued early in the year until this activity was transferred to the Bureau of Plant Industry, in accordance with the general reorganization of the bureaus under the Department. The processes demonstrated were the Bohler defiberizing machine and the Clemente-Gonzaga direct extraction of coconut-oil apparatus. The Bohler defiberizing machine was constructed by the Bureau from plans furnished by the inventor. The machine defiberizes coconut coirs in a few seconds and classifies the fiber into various grades. In the 1933 Carnival this machine was exhibited, and demonstrations were made of the industries that could utilize the fiber made from it, such as the manufacture of brushes, cushions, foot-mats, and mattings. The Gonzaga oil extraction apparatus showed the extraction of coconut oil direct from fresh coconut meat. These same machines were also shown in Iloilo and Bacolod, prior to their transfer to the Bureau of Plant Industry.

The Second Floating Exposition has been so far one of the most successful ventures of the Bureau in its effort to advertise and sell Philippine-made articles. The cableship *Bustamante* was used. The exposition lasted from May 12 to June 2, starting from the port of Manila and visiting 22 of the biggest ports of Mindanao, the Visayan Islands, and the Bicol region. The total sales of the exposition amounted to ₱24,050.19. The ports touched upon were New Washington, Capiz, Iloilo, San Carlos, Dumaguete, Cebu, Loay, Mambajao, Cagayan, Iligan, Misamis, Dapitan, Dipolog, Zamboanga, Jolo, Davao, Surigao, Tacloban, Catbalogan, Legaspi, Tabaco, and Masbate. The floating fair was met in all ports by big crowds of people anxious to see and to buy the articles carried on board. Thousands of people from towns beyond the ports also made efforts to go to meet the exposition. In some of the ports, however, the boat had to anchor at a great distance from the coast, and many people expecting to board the vessel were not able to do so. Eighty-two manufacturers and dealers placed goods on the *Bustamante* for the exposition.

Besides making heavy sales of the goods carried on board, the management of the exposition also established permanent trade connections between the manufacturers and the dealers and distributors in the ports visited. Forty-two new trade connections, mostly agents or manufacturers' representatives appointed to act as distributors, were established during the trip. The establishment of these connections was one of the

most valuable features of the exposition as it made the results of the exposition more lasting and permanent and has widened the local market for made-in-the-Philippines products. The practical results of the exposition are shown by numerous letters that have been received in the Bureau from manufacturers who have taken part in it, reporting increased sales of their products, improvement and expansion of their factories, and wider distribution of their goods in the provinces.

The First Caravan Exposition was held in May and June by sending a fleet of 10 auto-trucks heavily loaded with a large assortment of Philippine products to 87 municipalities of Western and Central Luzon, including those of Rizal, Bulacan, Pampanga, Bataan, Zambales, Pangasinan, Tarlac, and Nueva Ecija. It gave an exhibition of these Philippine products and also sold them to the people of the town visited. Sales amounting to ₱5,660 were made by the caravan. It is estimated that over 20,000 people saw on its way in the course of the trip. Fifty-seven local merchants and manufacturing firms took part in the exposition.

During the year the Bureau took part in various expositions, fairs, and garden days held in different provinces by sending to them Philippine-made articles for exhibition and sale. Among the provincial expositions in which the Bureau took part, were those of Aparri, Cagayan; Bayambang, Pangasinan; Binalonan, Pangasinan; Urdaneta, Pangasinan; Malasiqui, Pangasinan; Sta. Barbara, Pangasinan; Davao, Davao; Zamboanga, Zamboanga; Cajidiocan, Romblon; Calapan, Mindoro; Tanauan, Batangas; Surigao, Surigao; Naga, Camarines Sur; Leyte, Leyte; Batangas, Batangas; Jaro, Iloilo; Pasi, Iloilo; Janiuay, Iloilo; and Silay, Occidental Negros.

As another means of bringing the service of the Department of Agriculture and Commerce closer to the people, the Manila Trading Center and Exchange was created on June 19, 1933, and placed under the immediate supervision and administration of the Director of Commerce.

The Bureau established the trading center on the ground floor of the De los Reyes Building, Plaza Cervantes, Manila. Articles from all over the Islands were gathered, and shelves, stands, and equipment prepared, and by August the trading center was ready to open. The inauguration took place on August 17, 1933. The opening of the trading center was hailed everywhere as a great moment in the history of Philippine economic development. The public saw in it a decisive step to render more

effective the campaign for the development of Philippine industries. The trading center serves as a permanent national exposition of made-in-the-Philippines goods and also as a regular market center for their sale. Since its inauguration, the center has been attracting public attention and interest. It has been divided into two departments—the Sales and Exhibition Hall where Philippine manufactures are exhibited and sold, and the Produce Department where agricultural products like rice, corn, mongo, etc. are offered for sale to the public. The trading center has made a campaign to urge manufacturers of all kinds of articles in the Islands to send stocks of their goods to the trading center for sale. At the same time, it has launched a campaign to sell the goods that have been delivered or consigned to it. The center also buys local products for resale to the public at manufacturers' prices. In connection with its sales campaign, the trading center has conducted a weekly radio program over Radio Manila (KZRM), which is broadcast every Saturday at 7.45 P. M. Personal sales, solicitations, and canvasses have also been made by salesmen of the trading center directly to sari-sari store owners in Manila and buyers in the provinces. From August 17 to December 31, 1933, a total sale amounting to ₱75,150.59 was made. This consisted of the sales of manufactured goods consigned to the trading center in the amount of ₱10,569.75, manufactured goods purchased and resold by the trading center amounting to ₱1,284.26, and sales of agricultural products made in the Produce Department amounting to ₱63,256.58. The total income derived from these sales and from the various expositions in which the Bureau participated, which constitute a part of the activities of the trading center, amounted on December 31, 1933, to ₱2,711.38. The total expenses of the trading center for the same period amounted to ₱2,222.47, thus leaving a net profit of ₱488.91.

The most significant step taken in the campaign to sell and popularize Philippine-made products was the approval by the Philippine Legislature and the Governor-General at the latter part of the year of Act No. 4069 which sets aside the amount of ₱100,000 from the Rice and Corn Fund to be made available for the operation of the Manila Trading Center and Exchange. This step has given stability and permanency to the campaign and has provided the means for a more effective development of domestic industries. The first ₱20,000 of this fund was released and made available for the trading center during the

last quarter of 1933. Of the ₱3,471 appropriated for the operating expenses of the trading center during the last quarter of 1933, only ₱2,227.47 was spent, thus leaving an unexpended balance from this item of ₱1,248.53. Of the ₱260 made available for the purchase of equipment only ₱72.96 was actually spent. Out of the amount of ₱16,269 set aside for the purchase of Philippine products, only ₱1,122.08 was actually used, thus leaving a balance of ₱15,146.92. The Bureau has followed a conservative policy in the purchase of articles for resale in the trading center as an indiscriminate purchase might lead to stocking the center with frozen merchandise. Only those goods which have an active demand were purchased and advances were given only on articles which have good prospects of immediate sale. Hence at the end of the year there remained unspent out of the ₱20,000 allotment the amount of ₱16,582.49.

To extend the campaign to the provinces, the Bureau also started during the last quarter of 1933 to organize trading centers in the provinces. Inasmuch as the available field personnel is very small, and in order not to take all the time of the agents in the field, the provincial trading centers have been established by placing them under the direct management and supervision of trade promotion associations composed of active citizens of the important commercial centers. Before the end of the year, the trading center of Cabanatuan, Nueva Ecija, under the management of the Nueva Ecija Trade Promotion Association and the Dagupan Trading Center under the Dagupan Trade Promotion Association were organized, and steps were taken to establish the Iloilo Trading Center.

Coöperative marketing.—The campaign conducted for the speedy and proper organization of coöperative marketing associations has resulted in the incorporation of 15 new coöperative marketing associations in different parts of the Archipelago, thus bringing to 95 the number of such associations actually in operation, and in the elimination of obstacles to future organization among the tobacco growers in other places in the Cagayan Valley, the hemp growers in the Province of Sorsogon, the coconut growers in Laguna and Tayabas, and the rice growers in Central Luzon.

Thirteen associations in the Province of Isabela were assisted not only in the classification and bailing of the leaf tobacco delivered by the members to the associations for shipment to Manila, but also in obtaining loans from the Philippine National Bank.

Loans amounting to ₱64,960 were obtained from the bank on the security of 6,411 bales of tobacco received from these associations.

Three coöperative marketing associations were declared insolvent during the year and their funds and properties were administered and finally disposed of by this Bureau. These were the Baluarte Coöperative Marketing Association, the Biak-nabato Coöperative Marketing Association, and the Gapan Coöperative Marketing Association.

Fifty-nine bonded rice warehouses were licensed during the year. The bonds filed by these warehouses with the Bureau amounted to ₱901,658 while the total amount of insurance policies indorsed to the Bureau amounted to ₱773,000.

Rural Credits Section.—One new association in Hindang, Leyte, and another in Sta. Maria, Isabela, were incorporated during 1933, which brought the total number of agricultural credit coöperative associations in actual operation to 571 with a total membership of 99,413.

The summary of the financial statements received from these associations as of June 30, 1933 (the latest report available from the said associations) shows that these 571 associations made a total net earning of ₱67,073.18, which is classified as follows:

Surpluses	₱5,242.75
Dividends	26,830.43
Reserve fund	35,000.00

The working capital of these 571 associations marked an increase of ₱64,198.26 and the total amount of the actual circulating capital was ₱3,446,771.54. Membership increased by 1,566 members.

The campaign waged by this Bureau for the collection of loans due the Rice and Corn Fund from the said associations has resulted in a considerable increase of the collection as shown in the following tabulation:

Collection from January 1 to December 31, 1933:

Principal	₱49,324.44	
Interest		₱64,099.86
As compared with the collection made the previous year:		
Principal	21,881.81	
Interest		30,785.57
Increase	27,512.63	33,314.29
Total increases for 1933		60,826.92

Five associations that were indebted to the Rice and Corn Fund made full settlement of their accounts during the year, as follows:

	Original loan
San Jose, Batangas	₱5,000
Santo Tomas, Batangas	5,000
Maribojoc, Bohol	5,000
Placer, Surigao	3,000
San Clemente, Tarlac	5,000

Decisions were rendered by the Bureau on five cases brought by different parties against members of the boards of directors of the agricultural credit coöperative associations from which no appeal has been interposed, and five opinions were rendered by the Director in his capacity as legal adviser for the agricultural credit coöperative associations on different questions that were presented to the Bureau.

Manila stock market.—An active stock market was definitely established in Manila during the year. Two stock exchanges were organized so that today there are in Manila three different stock exchanges—the Manila Stock Exchange, the Philippine Stock Exchange, and the United Stock Exchange. The Bureau had direct supervision over the organization and operation of these exchanges and has helped to promote the business in stock securities during the year.

5. WEATHER BUREAU

Incidental with its activities in relation to meteorological conditions, the Weather Bureau gives a hand in the promotion of aviation in the Philippines by extending direct aid to pilots and aviation companies. This aid consists mainly in furnishing weather reports and meteorological observations. In this connection the Bureau proposes to conduct a study of the upper air by means of pilot balloons. Investigations of climatic conditions in places suitable for health resorts are undertaken by the Bureau, which is thus instrumental in a way in the promotion of health resorts.

6. DIVISION OF HOME ECONOMICS

Demonstration work on food preservation and preparation has been the chief activity of this Division, but present plans call for other equally important activities like home management, home improvement, meal planning, budgeting, marketing, child care, house planning, beautification of lawns and gardens, utili-

zation of waste materials, and other work pertaining to home economics.

The demonstration work is carried out in the office and in the field. During the year practical demonstrations were given every Thursday, Friday, and Saturday for the benefit of those interested in canning and food preservation, the utilization of darak, roselle, and soy beans as components of a well balanced diet, and the preparation of both fancy and economical dishes. An average of 60 students, mostly housewives, came regularly each demonstration day, making up a total of over 8,600 students for 1933. Besides the students who came regularly to learn food preparation and preservation at the laboratories of the Division in the Science Building, special demonstrations were made in private homes, in schools, and in some government institutions on the preparation of rice bran and soy bean dishes.

The Provinces of Tayabas, Pampanga, Bulacan, Batangas, and Camarines Sur, were visited and demonstrations on food preparation and preservation, especially the preparation of rice bran and soy beans, were successfully made in each. The total number of students taught in Mulanay and Tayabas, Tayabas Province, was 3,521; San Fernando, Pampanga, 2,302; Baliuag, Bulacan, 1,521; Naga and Ragay, Camarines Sur, 8,367; and Batangas, Batangas, 2,731.

In compliance with requests made by property authorities, and with the end in view of popularizing the utilization of rice bran, soy beans, roselle, bananas, coconuts, rice flour, and similar native healthful and nutritious products, the Division of Home Economics participated in the Mulanay Fair, Pampanga Carnival, Baliuag Fair, Philippine Chamber of Commerce Exposition at Naga, Batangas Fiesta, and Ragay Town Fiesta.

Special demonstrations were made on the preparation and preservation of cheap foods at St. Lukes and St. Paul's Hospitals on the occasion of Hospital Day, at the Manila Trading Center on the occasion of the inauguration and Ladies Day, at the Bureau of Health during the nurses' convention, and at the Assumption College during the operation of the Petite Bazar.

On October 28 the Division of Home Economics started broadcasting 45-minute programs most of which consisted of educational and instructive matter pertaining to health culture, meal planning, stain removal, efficient washing and laundering, preparation of native dishes, and the like. Authorities on home economics were invited to talk.

7. FISH AND GAME ADMINISTRATION

The Fish and Game Administration handles the enforcement of Act No. 4003 commonly known as the Fisheries Act, and Act No. 2590, as amended, providing for the protection of game and fish. It also has administration over activities pertaining to hunting and the conservation of wild animal life. In a word, the Fish and Game Administration looks after the proper development of the aquatic resources and the conservation of wild animal life in the Philippines. It gives demonstrations and renders assistance to people on matters pertaining to fishpond culture. Technical members of the staff of the Division are called upon from time to time to give advice to fishpond owners engaged in the cultivation of *baños*.

The introduction and distribution of fishes for cultivation is another important undertaking of the Division. Gourami, a large fresh-water fish introduced into the Philippines in 1927, has become very popular. Other species, mostly for use in home aquaria, have been distributed by the Division.

In the investigations of fishery grounds, herring, and "ipon" fisheries, and on edible crustaceans and mullusks, the Fish and Game Administration incidentally embarks on promotional activities such as giving instructions on the methods and time of catching particular schools of fish, disseminating information relative to the feasibility of developing certain phases of the fishing industry in localities where conditions warrant, and similar activities.

Through enforcement of the law, the preservation of game is fostered. These game refuges and bird sanctuaries are under the administration of the Division; namely, the Makiling Botanic Garden in Laguna, the northwestern corner of Mindoro, and Cavite Mountain, and Sombrero and Arenas Islands in Palawan. Besides these, all communal forests and communal pastures established by the Bureau of Forestry are game refuges.

8. DIVISION OF MINERAL RESOURCES

The extensional service performed by the Division of Mineral Resources is carried out in connection with the development of the mineral resources of the country, which is the main function of the Division. The Division conducts geological investigations in localities where location of claims and prospecting and development work are active. While much of the time is devoted to the routine work which, by the way cannot be distinctly di-

vided into general service and promotional work, still the Division conducts frequent geological surveys and mine examination, identifies rocks and minerals for the general public, assays ores, smelts and refines gold bullion for private individuals or companies, makes examination of well logs and determines suitable sites for artesian wells, and, in general, gives advice and help to persons interested in the mining industry. An important service rendered by the Division during the year was the evaluation of mining properties in coöperation with the Bureau of Commerce and the Bureau of Treasury in connection with the enforcement of the Blue Sky Law. As a guide to those interested in mining, the Division published a pamphlet entitled "A Brief Description of the Philippine Mining Laws, Rules, and Regulations."

B. RESEARCH WORK

1. BUREAU OF PLANT INDUSTRY

General statement.—The fundamental research activities of the Bureau are conducted at the Central Experiment Station in Manila, where the small stations and laboratories formerly scattered in and around the city were centralized and consolidated. Other research stations are the Los Baños Economic Garden and the Baguio Semi-temperate Fruit Station.

THE CENTRAL EXPERIMENT STATION

This station where the Central Office of the Bureau is located has an area of about three hectares. At present the work in plant breeding of annual and subannual crops, such as rice, cotton, tobacco, legumes, and vegetables, is done at the Central Experiment Station. Laboratories for plant pathological, entomological, and soil studies, as well as for researches in the physiology of crops, have been installed and are being used by the staff of the Bureau. Also an industrial plant for textile research is functioning in connection with the work supported from fiber inspection funds.

LOS BAÑOS ECONOMIC GARDEN

This station occupies the former Camp Eldridge at Los Baños, Laguna. It has been in operation for two years and is following up functions in accordance with its planned activities, as the assembling and culture of perennial economic plants of the world, the study of the economic behavior of these plants, and the

providing of materials for the study of their utilization and their eventual dissemination. The number of recorded species of economic plants cultured and under observation at the garden reached 293. There are now in the station 9,149 trees of which 774 are bearing. The estimated value of standing crops, both perennial and annual, amounts to ₱7,977.56. It had provided the Central Station with ₱1,080.72 worth of seeds and plant materials besides ₱52.85 worth of these materials sold or distributed free.

The accumulation of plant material must obviously precede experimentation. This material is provided in the greatest possible variety by establishing the systematic garden. It is provided on a larger scale in cases in which we can foresee the particular experiments for which it will serve. For this general purpose, there has been planted an area of approximately a half-hectare each of *Chrysophyllum caimito*, *Artocarpus champeden*, *Nephelium lappaceum*, *Cinnamomum zeylanicum*, *Flacourtia* (Almontchi) *indica*, *Lucuma nervosa* and *Elaeis guineensis* of the Deli and of the bura varieties or strains. There is also a field of 1.7 hectares planted with 20 varieties of banana. These are all subcommercial plantings. Besides providing material for future experimentation, they insure a supply of future propagating material in any quantity likely to be demanded; and, without being on a mass-production scale, will give the Bureau a basis for advice to commercial orchardists, incomparably more dependable than any based on the observation of specimens or isolated groups of trees.

Plant breeding and landscape work.—During this year the garden has gone beyond the provisions of material to the investigation of specific problems in several lines. The work in plant breeding consisted of planting different species of citrus for stock purposes, parent citrus varieties, and citrus hybrids from Tanauan Citrus Station. Introduction and propagation of desirable varieties of papaya, selection from the established papaya mixed plantation, and hybridization of papaya, were also undertaken. The pathological work was in the control of pests and diseases occurring in the garden. Twelve species of plants were infected with different plant diseases and ten were infested with plant pests, some being badly injured. A field with an area of 1,030 square meters was set aside for pathological work. Landscaping also received some attention and the work took the form of establishing an upper lawn section, a terrace

section, and an upper cutting section, and building a nursery shed and seven gates. The ornamental plants which are now in the garden consist of 18 annuals, 24 perennials, 25 shrubs, 4 trees, and 17 vines.

Work on ferns.—The Philippines being one of the richest areas in the work on ferns of horticultural value, and this material being almost unused and unknown locally, some efforts have been made to assemble it. To date, more than 100 native species are sufficiently established in the garden to permit an appraisal of their horticultural utility.

So far, the outstanding achievement of the garden in the field of agronomic research is the "domestication" of the fern, *Ceratopteris thalictroides*. Going on the general principle that a cultivated crop can always take the market away from a wild product, wild "paco," *Athyrium esculentum*, was planted for observation.

A bed was planted to *Ceratopteris*, producing perhaps a thousand sporelings. With this material on two beds of 100 plants each, the workers satisfied themselves that its culinary value had not been overstated. The next problems were its maintenance through the dry season, and its multiplication to a commercial scale. There followed the answering of the multitude of questions as to its agronomic handling, many of which were never thought of in the case of the older crops because the answers are data of human experience.

(1) Proven that, with irrigation, it produces uniformly throughout the year.

(2) Found vegetative means of reproduction quicker (but with slower multiplication) and more satisfactory than the use of spores—though the use of the latter was the plant's first recommendation.

(3) Grown it on the scale of a commercial garden, and proven that on used rice land it can be grown at about the same cost as rice.

(4) Developed a technique of harvesting suitable to the plant.

(5) Supplied material to the Bureaus of Plant Industry and Science, and to the Home Economics Division, for analyses and studies for cooking and canning.

(6) Placed it on the local market and established the fact that those who eat it and develop a taste for it will thereafter buy it.

(7) Sold it at a price which yields a gross return of probably two thousand pesos per annum per hectare.

It is not dreamed that a crop cheaply produced on the commonest type of agricultural land in the Philippines will actually yield a return of ₱2,000 per hectare for many months. What is expected is that the ease of production will glut the market and lower the price very promptly. Also, it is felt that the addition of a very cheap and valuable food will be as great a public service as the introduction of a remunerative cash crop. A study of the canning of this fern has been started in the expectation that, instead of paying up to ten times the present returns from rice land, it may be cheap enough to compete with spinach on the world's market, and provide a new export crop.

In summary, it may be stated that a promising crop new in the world's agriculture has been produced, and incidentally the first fern crop in history. The study of the old *paco* has not been dropped, but it is known that it can be at best a very minor crop in competition with this new one.

BAGUIO SEMI-TEMPERATE FRUIT STATION

The former area of this station was extended from 10 to 30 hectares. It has 1,163 trees in the permanent orchard, 12 of which are bearing. The estimated value of these trees is ₱1,891.50 and ₱45 of annual crops. The value of seeds and plant materials distributed, either sold or free, amounted to ₱2,795.60.

Main work of the Station.—In view of its location where the soil is very poor, hilly, and where plant diseases are numerous and destructive, the work in the station is now being directed to the solution of these agronomical problems. A new greenhouse was constructed to provide a greater space for the propagation of seedlings which require glass house protection. Minor investigations, in addition to the maintenance of the acclimatization orchard of temperate and semi-temperate fruit trees, have been attended to during the year. Long range soil fertility experiments and plant pathological studies are being started and will be carried on for several years. The year 1933 was mainly devoted to the landscape arrangement and beautification of the station as its topography demands, since, the station being in the heart of the City of Baguio, it is a part of its business to present a beautiful appearance, if it is to be a harmonious part of the summer capital.

AGRICULTURAL CHEMISTRY AND SOIL TECHNOLOGY

The activities conducted under this category consisted mainly of investigational work on tobacco, studies on soils, insecticides, plant utilization and agricultural chemistry in general.

Tobacco investigations.—This work consists of the analysis of cigarettes and cigarette leaves of the aromatic and non-aromatic types grown locally, and the study of the proper method of blending and flavoring tobacco for the manufacture of high-grade cigarettes comparable to the imported kinds. In addition to this, the smoking and burning qualities of cigars and cigar leaf wrappers are being studied, the object being to utilize the result of this study in the manufacture of better grade cigars.

Soil technology.—Analysis of soil samples coming from different stations of this Bureau have been made from time to time. The soil plague test which has been developed in the United States has been adopted in the study of Philippine soils. Preliminary results obtained by using the soil plague test on many samples of soil from our stations have shown that most of our soils are rather deficient in phosphorus while some are deficient in lime. In a few cases where the data obtained from soil plague test were used to determine what fertilizer to apply, satisfactory results were obtained as in certain portions of the United States, where the soil plague test gave very successful results.

Insecticide analysis.—The discovery of rotenone, an odorless crystalline constituent of certain tropical fish-poison plants that is thirty times as toxic as lead arsenate as stomach poison to silkworms, fifteen times as toxic as nicotine as a contact insecticide upon bean aphids, and twenty-five times as toxic as potassium cyanide to gold fish, and yet harmless to birds and mammals eating it, has led us to conduct an investigation on Derris, from which rotenone is commercially extracted. Different samples of Derris root and other fish-poison plants were analyzed with the hope of finding some local species that contain a large percentage of rotenone for commercial exploitation. For this important study different methods of rotenone analyses which have developed lately and we claimed to be more reliable and accurate than the earlier methods, are being tried. The manufacture of the insecticide has also been tried with very encouraging results.



Plant utilization.—By far the most important work being conducted in the chemistry laboratory is that in connection with the utilization of plants. In line with the diversification program which is advocated as a means of promoting the agricultural industries of the country, the proper utilization of raw materials produced locally in abundance comes as an inevitable corollary. The studies on this subject are grouped as follows: investigations on canning; pectins and commercial jam, jelly and marmalade manufacture; sulphuring and desiccation; fermentation of wines, vinegar, *nata*, and *toyos*, the preparation and vacuum packing of cereals (cashew, pili, coffee, calumpang, and other cereals, such as pinipig, etc.); pickle and sauerkraut fermentation; the manufacture of yeast and yeast culture; studies on the refrigeration of Philippine fruits, such as mangoes, pineapples, lanzones, coconuts, and other fruits; studies on slow and quick freezing of Philippine fruits and vegetables; the manufacture of juices and syrups from different Philippine fruits; the preparation of rice and other kinds of flour and their commercial utilization, the preparation of catsup, chutneys, and other sauces and condiments.

Agricultural chemistry.—The principal activities under this subject consist of routine analyses of various materials submitted by the different divisions of the Bureau, such as mango leaves, twigs, and buds that are being studied in connection with the smudging experiments on mangoes; the proximate and inorganic analyses of Philippine plant materials for food and feed and other purposes; and coöperative work with the Bureaus of Forestry and Animal Industry on the studies on latex and its commercial utilization, milk and its utilization and canning, and on the preparation of ham covers.

GENERAL INVESTIGATIONS ON GRAINS

Rice, corn, wheat, and milo have been the subject of investigation at the Alabang Rice Station.

Lowland rice.—Fifteen varieties of lowland rice were tested in connection with soil fertility. No significant results can be presented after only a year's test. In the study of comparative yield of different lowland varieties about 400 were tested. Under a similar plan of experiment, 19 varieties of glutinous rice were tested. Like in the first test, the yields were deter-

mined on the basis of individual plant performance, and definite conclusions cannot be made at present.

Dry season (palagad) rice.—Studies on varieties of rice for dry season culture have been continued. The varieties which have been found highly recommendable for planting are Guinangang Strain No. 1, Sipot, Dinagat, and Binicol, in the order named. So far these varieties have given the highest yields under average conditions.

Upland rice.—In connection with upland rice the four main lines of work consisted of tests of 4 standard nonglutinous varieties, tests of 11 aromatic varieties, tests of 11 glutinous varieties, and preliminary tests of 436 upland rice varieties.

Wheat.—From the experiments on wheat the following facts have been tentatively established. The Cagayan variety which has long been under cultivation in certain sections of the Cagayan Valley proved to be very much better than the foreign Karmont and Hard Federation in points of yield per unit area; that the best time for planting wheat under Lipa conditions is in the early part of November; and that the application of fertilizers at the rate of 300 kilograms of ammophos and 100 kilograms of bat guano per hectare increased the wheat yield very considerably. Increases in yield of the Cagayan wheat from 48.5 per cent to 178.9 per cent were obtained in the fertilized lots planted in different seasons. The Karmont and Hard Federation varieties gave poor yields.

Corn and Dwarf Milo.—Preliminary experiments to determine in what months of the year glutinous corn and Dwarf Milo could be profitably planted, indicate that in both cases the best time for planting is during the early part of July.

ACTIVITIES ON TOBACCO

The varied activities on tobacco were conducted at the Ilagan Tobacco Station, Alabang Rice Station, Maligaya Rice Station, and in the Provinces of La Union, Ilocos Norte, Ilocos Sur, and Abra.

Wrapper tobacco.—In the plant-to-the-row tests of selected F_3 wrapper hybrid strains at Ilagan, 10 strains of 6x-hybrid, 5 of Nx-hybrid and 11 of Ix-hybrid were studied. Out of these strains 7 lines were found to possess desirable characteristics and qualities for further and more extensive strain tests.

In the wrapper variety tests in the same station the varieties studied were Ilagan Sumatra, which gave a yield of 1,071.8 kilograms per hectare with 15.9 per cent wrappers; Ax-11

hybrid, 502.86 kilograms with 19.6 per cent wrapper; Bx-27 hybrid, 811.43 kilograms with 186 per cent wrapper; and Jx-hybrid 606.02 kilograms with 18.7 per cent wrappers.

Yellow cigarette tobacco.—The cigarette varieties tested at Alabang were Orinoco, North Carolina Bright Yellow, Adcock, Big Warne, and Conqueror; all gave fairly good yields in the order named.

In the variety tests conducted at Maligaya, the varieties Adcock No. 1, White Stem Orinoco, No. 2, North Carolina Bright Yellow, and Vizcaya were used. The Adcock No. 1 consistently gave the highest average yield. The computed yields of cured leaves per hectare were 1,247.22 kilograms for Adcock No. 1, 1,136.53 kilograms for Vizcaya, 895.95 kilograms for North Carolina Bright Yellow, and 880.36 kilograms for White Stem Orinoco.

In the seasonal planting tests, the object of which is to determine the best season for cigarette tobacco in Nueva Ecija, the variety Adcock No. 1 was used. The plantings made on September 8 and September 28 gave higher yields than the later plantings, the total computed yield per hectare being 1,356.94 and 930.63 kilos, respectively. Of the first seasonal planting 303.17 kilos of the total yield cured yellow and 538.15 kilos brownish yellow. Of the second planting 285.14 kilos of the total yield cured yellow and 339.69 kilos cured brownish yellow.

The results of the harvesting experiment tend to show that the color of the leaves at the time of harvesting has some bearing on the color of the cured leaves. The dark green leaves turned either light brown or dark brown or remained green. The light green leaves on the other hand turned bright yellow or light yellow. The leaves with light or bright yellow color when harvested turned light brown or dark brown. These results were consistently obtained irrespective of the method of curing employed.

Observations on the period of flowering have revealed the fact that the foreign varieties bloomed in 95 to 149 days. A knowledge of the blooming period serves as a valuable guide for correlating harvesting and maturity periods.

Turkish tobacco.—The investigations relative to the culture of Turkish tobacco gave results which may be summarized as follows: The Turkish tobacco is in a class by itself with regard to the development and quality of the leaves. In size the locally-grown leaf is comparable with the California-grown leaf.

While it thrives in a wide range of soil conditions, well drained and rather poor soils are preferable to insure its peculiar aroma. Sun curing in Alabang produced the desirable golden yellow color and sweetish aroma. The variety Samson Bafra showed variability in some of its important characters. The average yield at Alabang was about 12 quintals per hectare.

Filler tobacco.—In the filler tobacco tests conducted at Ilagan, the native varieties studied were Espada, Pampano No. 2, Vizcaya Pampano No. 1, and Repollo, which yielded 21.33, 19.56, 18.88, 16.69, and 13.6 quintals per hectare, respectively.

FIBER RESEARCH

Pests and diseases in connection with fiber research work.—The Bicol region, after a thorough survey, was found free of the bunchy-top disease, which previously destroyed the abacá plantations of Cavite. It is present in abacá plantations in Mindanao and Mindoro. The source of infection in the latter was traced to Cavite.

The studies on the stem rot of abacá have shown that weather conditions, especially prolonged drought, are favorable for the virulence of the disease. In regions like the Bicol Peninsula and Mindanao where there is a fairly uniform distribution of rainfall, the disease does not acquire alarming proportions. Out of 12 varieties the Sinibuyas and Minalabao of Cavite, were found to be generally resistant in the field, and this finding was verified by field inoculation.

A disease which bids well to become dangerous unless checked in time is the "abacá mosaic," discovered this year in Davao. In order to determine the causal organisms, transmission experiments, in some of which sucking insects are used, have been started at the Central Experiment Station.

Abacá fiber deterioration studies.—As far as the deterioration organisms and conditions in bodegas are concerned, the work is now complete. Complete disinfection of infected abacá by means of formalin fumes in the laboratory has been accomplished. It remains only to apply this finding in adequate air-tight chambers in order to disinfect the abacá bales economically on a commercial scale.

Selection and breeding.—In order to study the real merits of 1,500 selected hybrid seedlings, two plantings of them at different altitudes were made at the Los Baños Economic Garden. Only one and a half year-old hybrid plants, free from bunchy-top diseases, will be the subject of close observation.

Utilization of abacá.—During the year the utilization of coarse abacá sack cloth for baling tobacco has been widely adopted by tobacco merchants. The development of the looms for weaving double-width cloth for sack-making and for rug weaving was successful. The mechanical loom for coco matting from England is being adopted for abacá sack cloth weaving. Indications are that it will reduce substantially the cost of weaving abacá sack cloth. The problem of softening abacá sacks and eliminating the knots in the manufacture of abacá yarn is nearing a satisfactory solution.

Maguey and sisal studies.—Two main lines of work were undertaken; namely, the study of the process of retting and the improvement of maguey and sisal through selection and hybridization. In the second work, only one living hybrid plant, a cross of maguey and sisal, was obtained. While extensive crossings of maguey and Mauritius hemp were made in Lamao last year, the seeds were lost due to strong winds there.

Improved looms.—Two kinds of wide looms were developed to weave one-piece cotton bedspreads. One loom carries the shuttle and the other, a long needle. Both these looms worked satisfactorily.

RESULTS IN PLANT BREEDING

Rice.—A total of 36 hybrid strains of nonglutinous lowland rice was selected and cultured during the year. Being now in the F_2 and F_3 generations, they manifested a high degree of purity. Four of these strains, namely, strains Nos. 1, 2, and 3 of the Ramai X Inadhica, and Strain No. 5 of the Elon-elon X Inadhica, are rapidly being multiplied at the Economic Garden and the College of Agriculture, Los Baños. Besides good yielding ability and improved quality, the first two strains have been found to mature earlier than either parents. The three Ramai X Inadhica strains have shown a high degree of resistance to a certain leaf-spot disease to which the ordinary varieties of palay are susceptible.

Three varieties of glutinous lowland rice were crossed with "Malagkit Sunsong," a variety of superior quality, with the object of producing high yielding strains of improved quality.

Very limited crossing of upland rice varieties was undertaken. The cross Quinastila X Inantipolo and its reciprocal have been tested in the fourth generation, and promising constant types are in the process of being isolated.

Selection of mongo.—Out of 7 varieties tested, Nos. 12 and 2 were found to be the highest yielders. Variety No. 13 showed resistance to drought and diseases. Its defect is its small seed. It will provide good material for crossing.

Utong and cowpea crossing.—The native utong or paayap is rich in varieties and strains. The cowpea is hardier and more productive than the utong. Crosses between the two were made with the object of producing hardy and high yielding strains which may be used either as a garden or a field legume.

Peanut breeding.—Four native peanut varieties, Macapno, Tirik, Biit, and Spanish, all of which belong to the bunchy type, are small-seeded and susceptible to diseases but of early and uniform maturity, were crossed with the Virginia Jumbo which is a runner type, and a heavy yielder, but of uneven maturity. The aim is the production of high-yielding, big-seeded, early maturing and disease-resistant types. The preliminary results tend to show that this desirable combination of qualities may be evolved from the hybrids produced.

Soy bean breeding.—Three dwarf Japanese varieties of soy bean, with desirable yield, size, and color of seeds and uniform maturity, were crossed with the native Ami soy bean characterized by an abundance of branches and foliage, prolonged uneven maturity of pods, and a long growing period. The object of this cross is to effect a combination of the desirable characters of these two types.

Vegetable breeding.—With respect to improvement work on tomato, some hybrid strains produced from the cross Matchless X Pangasinan, were found outstanding in yield and disease resistance. Further work on these strains is necessary in order to include size and quality. Strains adapted for rainy season planting are being sought from the result of this hybrid. Native peas have been crossed with Alderman and Thomas Laxton varieties to effect improvement on the size and fleshiness of the pod of the former. Crosses between different garden beans are also being made with the object of creating bush beans for field scale planting under Philippine conditions.

Cotton hybrids.—Ten crosses of foreign varieties of cotton were made last year to improve the Batangas and Ilocano varieties. It is expected that from the second generation, now in culture, some early maturing strains with long staples and high yielding ability will be isolated.

VEGETABLE RESEARCH

Field studies on vegetables were conducted at Alabang, Lipa, and the Central Experiment Station.

Cabbage.—All the seven varieties of American cabbage tested at Alabang produced heads which, although smaller than those produced in the Trinidad Valley, were solid,—just the type for the market demand.

In the acclimatization test of cabbage at Lipa, 10 American and 11 German varieties were tested. In this trial none of the German varieties showed adaptation. Three American varieties, Succession, Allhead Early, and Charleston Wakefield, have shown some promise.

Five Chinese cabbage varieties were tried. Out of the four varieties which germinated, three varieties, the Chi-Hi-Li, Chihli, and Wong Bok, the last named being the variety raised in the Trinidad Valley, produced heads.

Asparagus.—In the acclimatization test of four varieties of asparagus, namely, Baguio, Palmetto, Mary Washington, and Giant Washington, some of the plants produced spears, showing the possibility of growing asparagus under Lipa conditions.

Tomatoes.—Twenty-one varieties of foreign, native, and hybrid tomatoes were tested. Out of this number, the promising varieties and strains are being tested at the Lipa and Central Experiment stations.

In the study at Lipa of wilt-resistant varieties of tomato, including Marglobe, reputed in the United States to be resistant to the disease, none showed complete resistance. A few plants of the strains Nos. 1, 2, and 3 of the hybrid Matchless X Pangasinan, grew to maturity and produced a fair number of sound fruits. The seeds of these were saved for similar succeeding tests.

Lettuce.—Out of 13 varieties of lettuce tested, 4 produced good plants. The most remarkable of these in uniformity of stand, hardiness, attractiveness, and agreeable taste, was the German "Pflücksalat."

Bermuda onion.—Preliminary study of the flowering adaptability of the Bermuda onion in Lipa was tried by monthly plantings. This test is of importance as it may show a possibility of producing onion seed locally instead of importing it at a high price from abroad.

Acclimatization of miscellaneous vegetables.—The acclimatization tests were originally confined to semitemperate and temperate vegetables; later on some ornamentals, as well as perennial and viny vegetables, were included. Twenty-four kinds of vegetables, including asparagus, cauliflower, broccoli, kohlrabi, parsley, salsify and the more common kinds, nine viny vegetables, and the dahlia, gladiolus, everlasting, and lily, were tested.

Legumes.—In the regular season tests with peanuts, comparing six native varieties and the imported Virginia Jumbo, the latter out-yielded all the native varieties. Likewise, in the rainy season test, the Virginia Jumbo repeated the same showing in yield superiority over the native varieties. Of the seven newly imported varieties of Japanese soy beans, six showed promise of being adapted to local conditions. Among the six varieties of cowpeas tested, only the New Era cowpea and red utong produced pods. The variety tests on the different strains of mongo conducted at Alabang, showed strain No. 4 and especially No. 13 to be markedly superior in yield over the other strains.

WORK ON FRUIT TREES

During the year intensive studies on fruit trees of commercial possibility, including mango, cashew, avocado, lanzon, and caimito, have been undertaken. The work covers different phases of physiological study in relation to the behavior of the trees and their agronomical and horticultural requirements. The studies on mango and cashew include growth and variability, correlation between the different parts of the tree and the formation of flower buds, the relationship between the crown development and the fruiting habits, stomatal activity, morphological study of bud development, selection and isolation of consistently productive strains which yield fruits of good quality, smudging work to induce early flowering in mango, pruning experiments, stock tests, and study of the different varieties or strains of cashew. Following the same general outline, the relation of node and leaf formation to the fruiting habit of avocado, a study of the cause or causes of the premature dropping of fruits, the production of multiple seedlings from seeds, the relation of the color of young foliage to the color of ripe fruits, a study of the growth and color development of the young foliage, a study of the length of life of bearing twigs after harvesting, compilation of data on previous work and gen-

eral survey work on avocado, have also been conducted. Similarly, the work on caimito embraces studies on the general formation and distribution of the root system in relation to the development of the crown, the correlation between the upright branches and the fruiting habit, the effect of shade upon the number and size of leaves in bearing and non-bearing twigs, the production of flowers and fruits at different leaf-axils and the time of opening of flowers, the effect of shade on the production of flowers of old bearing twigs, and the falling off of immature fruits. In addition to these multiple activities a compilation of previous work and a general survey and improvement work at Lamao were started during the year. The work on lanzon includes studies on the correlation of the length and diameter of bearing and non-bearing twigs to its fruiting habit, flower and leaf bud formations and the selection of a seedless strain.

Since the studies enumerated above relate to perennial fruit trees requiring long periods of observation, no conclusive results can be presented within the relatively short period embraced in this work.

RESEARCH WORK IN PLANT PATHOLOGY

The Bureau has now a better equipped laboratory to handle plant diseases. As usual, routine activities in the identification of materials submitted for determination, giving advice on the proper control measures of various diseases in order to prevent their dissemination, and survey of the existing plant diseases in the Philippines, were undertaken. A plant pathological herbarium was established during the year.

Abacá disease studies.—Studies on the stem-rot of abacá in the Philippines and deterioration of abacá in storage were continued.

The study on the stem-rot of abacá showed that banana stem-rot organisms produce the same disease on abacá. It was also shown that resistant varieties may be developed as a means of control. Sinibuyas and Kinalabao varieties are comparatively resistant and Canton is the most resistant. The last named variety may be used for breeding with Sinibuyas or Kinalabao for disease resistance.

The studies on deterioration of abacá tend to show that fumigation with formalin and sea water treatment partially arrest the process. From the behavior of the causal organisms *Asper-*

gillus sp. with best growth at 30.6°–38.7° C., *Penicillium* sp. and *Chaetomium* at 27°–28° C., control of deterioration would seem to hinge on modification of conditions in the bodega, that is, lowering the temperature by means of good ventilation.

During the later part of the year, extension work on the control of various diseases on truck and other crops in Batangas was undertaken successfully.

Diseases of cotton.—*Helminthosporium gossypii*, frog eye, and angular leaf spot of cotton caused by *Phytophthora malvacearum* were studied in the cotton cultures at the Central Experiment Station.

Black rot of cacao.—Studies on the control of this disease with the use of Bordeaux mixture and lime sulphur showed that the former is the more effective fungicide when applied to young and maturing pods, reducing infection from 33 to 12 per cent.

Other diseases studied.—Other diseases studied were the root stock disease of strawberries caused by a fungus of the genus *Fusarium*, which was controlled by Semesan dust; the *Rhizoctonia* of Irish potato which was partly controlled by a 1:1,200 mercuric chloride solution with 1 hour soaking; the bud rot of coconut, especially with respect to the real causal organism; the seedling disease of Hakubi soy bean seedlings caused by *Phytophthora* and *Phythium debaryanum*; the powdery mildew of tobacco noticed for the first time to be caused by a fungus of the genus *Erysiphe*; white rot, soft rot of bulb, and smut diseases of onion; dry rot of citrus fruits; and heart rot of arrowroot.

RESEARCH WORK IN ENTOMOLOGY

The locust campaign which followed soon after the leaf-miner control work required the services of the entomology research men and the study of definite problems assigned to them was temporarily laid aside. With the reorganization and the marked improvement in the locust situation these workers can now resume their work, particularly on the studies of pests that are just as destructive as locusts, and ecological studies of these insects which should furnish data for an effective and economical program of pest control. A sound program of biological control and a calendar of spraying in each locality depend largely upon accurate ecological data.

Locusts.—Along with the campaigns in the provinces, observations and tests were made on the control of the migratory locust, particularly with the use of poisoned bait. As stated

elsewhere, rice chaff and bagasse were found to give better results than ordinary rice bran. The use of bagasse appealed to the sugar planters in Negros, because it is a by-product of the centrals. In Cebu and Leyte, the bagasse bait was also used in large quantities. On the whole, the locust control work has been made more scientific, effective, and economical with the use of bait and dust. This may be considered as one of the outstanding achievements of this Bureau.

The coconut leaf miner.—Research on coconut leaf miner (*Promecotheca cumingi*) was continued hand in hand with the actual control work. Observations so far indicate that the different parasites on leaf miner are much fewer during the rainy season than during the dry season and that rainfall has a direct effect on the percentage of parasitism. It has also been observed that during the rainy season rain water penetrates into some of the mines of the leaf miner, killing the parasites in the immature stages but not the healthy leaf-miner larvæ and pupæ. This phenomenon may be one of the causes for the periodical outbreak of the leaf miner in San Pablo and other places. In the case of San Pablo, however, it is believed that additional factors must be at work, since there the appearance of the leaf miner as a pest is more frequent than in other places. The scope of the investigation is therefore being widened in order to definitely find out such factors.

Mango insects.—The control of mango hoppers and other insects that attack mango is one of the most complicated problems in the field of entomology. There exists a very complex interrelationship between the many different insects and other organisms found on mango. This complexity is one of the reasons why spraying work has apparently given good results in some places, and failed in others. Painstaking research work that may require years is necessary for the solution of the problem.

Onion pests.—Early in the year diseased onions were brought from Batangas. These revealed numerous white spots on the affected plants. Careful examination showed the presence of thrips, which from the descriptions appear to be the *Thrips tabaci*, a serious pest of onions. Soap solution containing 3 to 5 grams of powdered soap per liter of water was found to kill the thrips.

The larvæ of a certain species of click beetle have also been found destroying onions in Cavite. This is one of the first records of injury on onions by the larvæ of the family Elateridæ.

Careful investigations are being made in order to determine the species concerned and the necessary control measures.

Cotton pests.—A preliminary study has also been made on the pests of cotton. Among the insects that are found most destructive are a leaf hopper, plant lice, mealy bugs, a boll weevil, and a leaf miner. Several kinds of caterpillars have also been found rather destructive as they feed on the leaves. One of these caterpillars has been found parasitized by a hymenopterous insect similar in habit to that which attacks the rice army worm. It has been noted that certain varieties or strains of cotton are only slightly attacked by leaf hoppers and the other sucking insects. While spraying is practicable, the narrow margin of profit may not justify it under field conditions and from the average farmer's standpoint. Hence, other methods of control should be sought.

Mites or red spiders.—Field investigations have revealed an importance of these pests not often realized heretofore. They have been found to curtail to a considerable extent the yield of certain truck crops like soy beans, peas, and other legumes. The species concerned belong to the *Tetranychum* group. Another kind of mite has also been found affecting pepper, potatoes, tomatoes, and papaya. It is quite possible that there may be at least two different species affecting these plants. While, as in the case of cotton, spraying with soap and lime sulphur has been found effective to some extent, some other methods applicable under extensive field conditions, particularly in the case of soy beans and peas, are necessary.

Testing of insecticides and fungicides and other preparations.—During the year a number of chemicals or preparations were submitted to the Plant Sanitation Division for actual testing on insects before any was offered for sale or employed in the field. Among these are dry-lime sulphur, fungi-bordo (dry Bordeaux mixture), Derris preparations, Noxon, lead arsenate, and calcium arsenate. A red squill liquid preparation harmless to domestic animals and man was tried against rats in the laboratory and was found to kill them within twelve to twenty-four hours.

2. BUREAU OF ANIMAL INDUSTRY

VETERINARY RESEARCH WORK

General statement.—In veterinary research, the main efforts of the Bureau were directed toward the perfection of the rinderpest vaccine. During the year the research laboratories were

fortunate enough to obtain part of much needed equipment and to improve that which is now on hand. One of the most important changes made is the construction of a separate anthrax shed far from the main building, thus minimizing the possibility of contamination with the disease. As a result of further improvements on equipment and processing of rinderpest vaccine, the laboratory has succeeded in producing a vaccine which contains greater potency and which is safe to use. However, the most important accomplishment of the year in research work is the improved production of dry rinderpest vaccine. The evolution of this vaccine to a point that has made its use possible under field conditions with satisfactory results, has very far-reaching effects. One of the chief factors that retard the final eradication of rinderpest in this country is the fact that the wet vaccine has to be kept on ice in order to maintain its potency. The dry vaccine can be safely used in mountainous regions where ice is not available. With the combined use of the wet and dry vaccines, vaccination work in mountainous regions, considered impossible heretofore, can now be carried on.

Besides the progress made on the production of a better rinderpest vaccine, the year has also seen the first successful cultivation of avian pest virus in tissue culture.

Another contribution to the advancement of veterinary science is the development of a simple but effective method of isolating single trypanosomes. This method is notable in that it is bound to revolutionize the present expensive and equally fatiguing process of isolating single trypanosomes. As a result of this simple method, the production of surra by the injection of a single organism of the disease has been successfully accomplished. Through this experiment, the conclusion has been arrived at that mechanical transmission of surra by flies is, for the present, the most important factor in the spread of the disease.

The belief that carabaos are immune to tuberculosis has been disproved. It has been shown by experiment that carabaos may also succumb to the attacks of tuberculosis, although they are more resistant than cattle, swine, or human beings.

Other biologic products manufactured in the laboratory of this Bureau are rabies and fowl pox vaccines, blood virus of hog cholera, and hemorrhagic septicemia vaccine.

The last named product needs more than a passing remark. The increasing toll from hemorrhagic septicemia during the last few years has inspired officials of the Bureau to make laboratory studies of the control of this disease. As a result of these

efforts, a satisfactory vaccine for hemorrhagic septicemia has been found.

As in previous years, shipments of rinderpest vaccine in limited quantities to Hongkong for the vaccination of dairy animals there have been made. The Reconstruction Department of the Chinese Government has likewise been furnished with rinderpest vaccine. Dr. E. A. Rodier, formerly of the Bureau's research laboratory and now Director of the Animal Disease Control Bureau of Kwangsi Province, China, was also furnished with 500 grams of dry rinderpest vaccine.

The completion of the veterinary research laboratory building about the last quarter of the year under review is worth recording. Formerly the building was intended primarily for a laboratory, but later on the interior plan was altered, making the construction of the building adequate to house all other divisions of the Bureau of Animal Industry.

Rinderpest.—Improvements in the preparation of wet vaccine follow:

(a) *Processing.*—Correlation and systematization of the various steps involved have resulted in a more efficient and economical technique so that the entire procedure can now be followed up intelligently without sacrificing technical accuracy. Apparatuses and equipment have been so rearranged, modified and grouped in logical sequence so that their manipulations are rendered safer, more orderly, and efficient. Practically every operation is now performed under a glass hood.

(b) *Purity tests.*—The modifications and improvements introduced in the processing have resulted in a product the purity and safety of which are nearly what might be desired. Formerly the spleen and lymph glands were milled together before testing; now they are milled and tested independently of each other to make sure that both are free of pathogenic organisms.

The average counts of nonpathogenic bacteria were reduced to thirty-seven per cubic centimeter. By introducing various new sensitive sterility media and using larger amounts of vaccine, the purity tests have been fortified to such a degree as to preclude the presence of dangerous contamination in the finished product. Likewise, the safety test by small animal inoculation was strengthened with the employment of young, healthy, laboratory-raised rabbits, guinea pigs, and mice.

(c) *Potency.*—The standard of average protection on test cattle and carabaos was raised from 70 per cent in previous years to 89 per cent during the fiscal year 1933. The improvements in the processing technique were greatly responsible for the increase in potency which is comparable to that of other vaccines on the market.

Researches.—(a) Cultivation of the rinderpest virus in vitro. The preliminary attempts at cultivation in 1932 gave negative results. Embryo tissue of rabbits, guinea pigs, chickens, and goats were found generally

unsuitable for cultivation. In guinea pig embryos survival of virus was noted, but continuation in series failed at incubator temperature of 37° C. At the beginning of 1933 attention was turned to the use of homologous tissues of cattle embryos. At this time due to foot-and-mouth disease outbreak in the city abattoir (the only source of such materials) further work was postponed indefinitely. Fluid media containing blood serum of plasma likewise failed. The work will be resumed at an opportune time when these natural obstacles are out of the way.

(b) Factors contributory to the perishability of wet vaccine are being investigated.

(c) Preservation of rinderpest tissues without chemical intervention is under experimentation.

(d) Determination of the length of immunity conferred on the carabaos by the single injection method in progress.

(e) Determination of types of immunity (tissue or humeral immunity) induced by the vaccine in progress.

Further improvements in the preparation of dry vaccine were made as follows:

(a) An ordinary coffee grinder was so fitted out as to grind and strain the dried material simultaneously in one operation.

(b) Improved methods of drying over calcium chloride which were found eminently successful in desiccating the materials in four weeks at ice-chest temperature.

(c) The final material was rendered into such fine powdered form as to be suitable for field administration.

Researches on dry vaccine covering the following topics are being carried out:

(a) Methods of rendering the vaccine bacteria-free without impairing its potency.

(b) Keeping quality of the vaccine after exposure to various temperatures, particularly room and incubator temperatures.

(c) Purification of the vaccine.

(d) The rôle of tissue lipoids in relation to the antigenic value of the vaccine.

Foot-and-mouth disease.—From time to time the Bureau has been called upon to diagnose focal outbreaks of foot-and-mouth disease in Alabang and Muntinlupa, Rizal Province, and other places outside the city limits. Laboratory diagnosis by animal transmission and clinical methods were employed to meet the emergencies. Abattoir specimens were regularly received for identification. In most cases transmission from cattle lesions failed in guinea pigs and swine. Owing to the unusually mild type of infection met with, considerable difficulty was encountered in making a final decision. A paper by Dr. T. Topacio entitled "Transmission of Foot-and-Mouth Disease from Lesions

of Cattle, Carabaos, and Suckling Pigs to Weanling Pigs and Guinea Pigs," was published.

Researches.—A suitable foot-and-mouth disease laboratory should be established in an isolated site to study the biology of the various strains of foot-and-mouth disease in the Philippines—typing the strains. This was recommended by the Special Committee on Foot-and-Mouth Disease created by the Director of the Bureau of Animal Industry. The ultimate success in control measures would depend on our knowledge of this subject.

Avian pest.—(a) The most outstanding work accomplished concerning this disease is the successful cultivation of the virus in tissue culture by the use of chick embryos in normal plasma. The virus was carried through *in vitro* for 31 generations over a period of 112 days representing a multiplication expressed by the formula $(1-30)^{-31}$. Available literature seems to indicate that this was the first time this virus was cultivated *in vitro*.

(b) Experiments showed that the minimum infective dose of avian pest blood was 1 cc of a dilution of 1 to 25,000.

(c) Likewise, it was found that the cultured virus gave promise in the preparation of a vaccine of active immunizing properties. Extensive work along this line is in progress in the hope of working out a potent prophylactic vaccine.

(d) Tissue vaccines variously prepared from organs of infected birds are again being tried as prophylactic. Exploded tissue vaccine has been tried with varying results.

(e) Histopathological studies of affected organs from diseased birds and of growing cells in tissue cultures revealed no important intracellular changes except nuclear pyknosis of epithelial cells.

(f) Further histopathological studies of affected tissues are in progress in an attempt to identify intracellular inclusions produced by this virus.

Hog cholera.—(a) Several experiments were begun this year regarding the prospect of a tissue vaccine variously prepared. Results obtained so far are not yet conclusive, but work is in progress to determine ultimately their respective protective merit. Work in this direction has been much delayed on account of the pressure of work in other more important activities of the laboratory and because of the difficulty of securing uniformly susceptible pigs.

(b) A dry tissue vaccine simulating that of dry rinderpest vaccine is being studied.

(c) The efficiency of bone marrow vaccine is under study.

Rabies.—(a) The laboratory has been keeping a supply of rabies vaccine prepared by the Semple method. Requests from various sources have been filled regularly. Experimental results with a modified Semple vaccine have given good results.

(b) This laboratory has commenced the fixation of a street virus with the idea of obtaining a local strain of fixed virus in the preparation of a polyvalent rabies vaccine.

Fowl pox.—Some interesting comparative results were obtained with three strains of fowl pox virus as vaccines; namely, fowl strain, pigeon strain, and turkey strain. The most successful takes were observed in fowls vaccinated with the turkey strain. Laboratory and field results tallied with each other very well. This strain is being given extensive use in the field with a view to accumulating more data regarding its efficacy and uniformity of behavior.

Tuberculosis.—A preliminary report on tuberculosis of swine in the Philippines with special reference to the types involved has been completed and is being published in the December 1933 issue of the Philippine Journal of Science.

Researches.—(a) The survey on incidence in cattle, swine, carabaos, and chickens continues. Isolation of various strains from organ lesions and body fluids of domestic animals and man continues in the hope of ultimately determining which type of tuberculosis infection predominates.

(b) Studies on the biology of the tubercle bacillus have been started. Delipinization of the organisms by chemicals is being tried to secure non-acid fast cultures for the study of their viability and immunological characteristics. A successful cultivation of such organisms in series would open up various phases in the immunology of tuberculosis which remains a puzzle to medical science.

(c) Previous tests have demonstrated that Philippine carabaos can be successfully infected with the bovine type resulting in typical clinical tuberculosis. On occasions it proved fatal with lesions of "galloping consumption"—miliary tuberculosis. Further work is being conducted.

Hemorrhagic septicemia.—(a) Inasmuch as the work on hemorrhagic septicemia vaccine was successfully concluded with the production of a potent bacterial vaccine, there remains no further problem of practical import. The method employed therein is now being applied to a related septicemia disease of chickens, so-called "fowl cholera."

Fowl cholera.—Until now, the experimental results obtained from different types of bacterial vaccines prepared in this laboratory against this disease appear satisfactory and warrant the statement that the final solution of this problem is drawing near.

Swine plague.—Swine plague vaccine has been tried on a limited scale, but owing to the scarcity of pathological materials from which to isolate fresh strains, the work has not prospered as rapidly as might be desired. As favorable opportunities present themselves they will be made use of without delay.

Pullorum disease.—Pullorum disease of chickens has not been definitely recognized in this country, but blood agglutination tests performed on suspicious birds of a certain breed (Nagoya hens) revealed some good reactors. On post-mortem, the ovaries did not show typical pullorum ovaries. Attempts to obtain cultures from such ovaries were negative. However, investigations are proceeding concerning this disease.

Brucelliasis of swine (swine infectious abortion).—This disease has not yet been reported officially in the Philippines. With the exception of a few imported cows at Alabang which showed an epizootic form of abortion some 15 years ago, there are no cases of similar nature available in official records. More recently, however, a few cases of abortion were reported from the hog farm of the Correctional Institute for Women at Mandaluyon, Rizal. Agglutination tests of sera from the aborted pigs revealed positive reactors. Isolation of the *B. abortus* from the fetuses was not, however, entirely successful. Although the serum reactions were positive, the identity of the true causative agent must await the isolation of the bacillus from the infected material. Over one hundred blood specimens from swine at the city abattoir subjected to agglutination revealed two highly suspicious reactors. Further inquiry is in progress regarding this disease.

Surra.—Some work has been accomplished concerning the mechanical transmission of surra organisms.

(1) The successful transmission in rats, guinea pigs, mice, dogs, and horses by subcutaneous or intraperitoneal injection of single trypanosomes in experiments recently concluded, definitely established that mechanical transmission by the *Tabanus* flies may be after all the most important factor in surra transmission. A simple technique for the isolation and injection of

single trypanosomes was published in the Philippine Journal of Science. The method was used in the transmission experiments.

(2) The complement-fixation test for surra has been studied on a limited scale by testing experimentally infected horses or mules. The test is a good deal more accurate than the microscopic examination, but involves a method which can only be used in a well-equipped laboratory.

(3) The mercuric chloride test, although used only as an aid to microscopic diagnosis, has been found fairly accurate in real positive cases, but as in all chemical tests the sources of error reside in the interpretation of results. A negative animal by the complement-fixation test would sometimes show positive reaction in chloride test. With experience and when due allowances are made on the scale of interpretations, however, the mercury test may be helpful in the field in conjunction with microscopic diagnosis.

(4) The preparation of an antigen for the precipitation test against surra is being conducted as a research. Investigation on the curative properties of naganol in the treatment of equine surra has been started.

(5) A biological test for pregnancy in mares along the lines of the Aschheim-Zondeck test by the use of blood from suspected cases is also being tried. Owing to scarcity of material for examination the work has to take a slow progress.

ANIMAL PRODUCTS RESEARCH

General statement.—Experiments in the various lines of meat products generally found in the market, are carried out in spite of limited resources, and at present there are produced in small quantities meat products that are in constant demand in the market, like hams of various styles, sausages, and bacons. In fact, it is the opinion of disinterested parties that in quality, taste, and appearance, the animal products produced at the Bureau of Animal Industry laboratories compare favorably with those of foreign manufacture.

Experiments on dairy products with the incomplete equipment in the plants have also been made and success has been obtained in canning milk so that it can stand fresh for months under local conditions. Were it not for the production cost of canning and the high cost of the cans, the preservation of dairy products could be so developed as to enable to supply at least part of the local demand.

There are two important considerations which have prompted officials of the Bureau to start the work, namely, (1) the growing need of economic self-sufficiency, which can be met by developing the vast potential animal resources of the country, and the fact that the Philippines import yearly meat and dairy products to the amount of ₱8,000,000; (2) the new economic policy of diversification as a means of placing the economic structure of the country on a more stable basis.

For years now no live cattle for beef purposes have been imported, the cattle ranges in various parts of the country supplying the local market with all the meat it could consume. However, it has been noted that imports of frozen beef have been going on as briskly as before, if not more, and that the importation of canned beef has not decreased and the price has not been lowered. This only goes to show that there are latent possibilities for expanding and promoting the packing industry of this country.

Although there is still much to be done in the improvement of our livestock, one thing is certain: that the Philippine Islands are, in fact, self-sufficient as regards beef cattle as well as hogs, and the way is open for the industrialization of animal products.

To properly carry out this important undertaking, equipment is indispensable. Some of the essential machines have been acquired, but more equipment is necessary. An antiquated refrigerating room is now under process of alteration and repair for adequate storing of meat and milk products, and a smoke house fitted with steam driers has been constructed.

Meat products experiments.—In the preservation of meat products, most of the work done was with pork. Experiments in proper slaughtering of hogs, proper dressing and chilling of carcasses, and different cures of pork, were conducted. A limited work on some by-products, both edible and inedible, has also been included in the principal experiments. Experiments in several packing house products were conducted and observations were made on the acceptability of the products as to appearance and flavor, and also on their corresponding keeping quality under local conditions. The by-products experimented upon with encouraging results were the following; open kettle lard, fresh pork sausage, native longanizas, bilbao style chorizo, head cheese, head sauce, liver sausage, liver loaf, pig's feet pickle, cured butts, ham loaf, cured loins, Canton style chorizo, cream sau-

sage, mince meat, canned cured tongue, potted meat, canned deviled ham, canned potted tongue, meat scrap for poultry feed, liquid glue, and different animal casings.

Experiments on poultry.—Only two experiments were made on poultry due to lack of facilities. These served as practical exercises in dressing the birds properly and in determining how long the carcasses could be kept under chilling temperature. The experience gained was not very encouraging as the birds could be kept only a week in the refrigerator in good condition. After a week the meat started to dry up, darken in color, and decompose. More experiments should be undertaken with poultry especially in freezing the fresh carcasses.

With chicken eggs, however, tests were successful in determining how long the eggs could be kept in cold storage with or without the previous treatment of water-glass solution, lime-water solution, and neutral oil.

Milk experiments.—Experiments on some milk products were conducted whenever milk was available. During the year 758,960 liters of fresh cow's milk were handled. Several experiments with milk products were failures, but others were encouraging.

Tests with the coöperation of the Bureau of Plant Industry, in making "pastillas de leche" were successful after several trials.

It was proven that good butter, cottage cheese, and different kinds of market milk can be produced locally whenever enough milk is available.

The successful canning of fresh cow's milk, however, is the most outstanding result obtained in milk experiments. Milk canned almost a year ago and kept at room temperature in the laboratory since then is still good. The separation of cream is the only defect noticeable after long storage, otherwise the milk is kept sweet. It is believed that the use of vizcolizer to break up the fat globules before canning the milk will eliminate this defect.

ANIMAL BREEDING EXPERIMENTS

The Bureau of Animal Industry conducts experiments on animal breeding on its various stock farms. The experiments include horse breeding, breeding of dairy animals, upgrading of cattle for slaughter purposes, and raising of purebred swine. In view of the fact that there is no definite line of demarcation

between promotional activities and research work on animal breeding, a more lengthy discussion of this subject appears in this report under "Extension Work."

EXPERIMENTS ON EXOTIC PASTURE GRASSES

The use of foreign breeds of animals to improve the native stock necessitates the undertaking of experiments on pasture grasses. The introduction of exotic pasture grasses and forage crops is not only necessary but it is also the most economical way of solving the problem of appropriate feeds. During the year a limited variety of forage crops and pasture grass seeds were imported and distributed to the various farms of the Bureau where climatic conditions were believed favorable to their growth. Some of the most important pasture grasses that have been imported and which look promising are: Dallis, carpet, Rhodes, Natal, Kikuyo, Yaragua, and Bermuda grass. Of soil-age crops that have been planted on some of the farms for forage purposes the following are the most recent importations: Japanese millet, Teosinte, Milo maize, Sudan grass, Japanese or Uba cane, Napier grass, and Guinea grass. The following legumes were also planted for forage purposes: velvet beans, soya beans, tapilan beans, and cowpeas.

3. BUREAU OF SCIENCE

General statement.—This Bureau is required to make investigations and conduct experiments of a technical nature for the promotion of science and industry; to coördinate and make available the results thereof; to perform all examination, analyses, and tests necessary in the acquisition of materials, supplies, and equipment by the Government; and to serve as a center of general scientific research by:

(a) Conducting researches in anthropology, ethnology, botany, and the natural sciences in general.

(b) Establishing and maintaining a national museum of science and industry, and regulating the exportation of museum specimens. (Act No. 3874.)

(c) Establishing and maintaining laboratories for the manufacture of vaccines, sera, and other biological products.

(d) Keeping the fundamental standards of weights and measures for the Philippines, and instruments of precision; comparing secondary standards therewith; and the certification of the secondary standards according to law.

(e) Conducting investigations into the causes, pathology, and methods of diagnosing and combating the diseases of man, of domesticated animals, of animals utilized for food, and of plants useful to man.

(f) Undertaking special investigations and work which may be needed by other branches of the Insular Government, and which may require laboratory facilities or scientific knowledge of a specialized character.

(g) Conducting investigations into the quality, composition, or properties of articles of food and drink; of gums, resins, drugs, herbs, oils, and other plant products; of soils and fertilizers; of cement and other construction and commercial materials; and of mineromedicinal waters of the Philippine Islands.

TESTS AND STANDARDS

Paper manufacture.—The work of improving a paper machine started last year was continued. This activity points the way to a new industrial field, that of paper manufacture, which gives promise of a bright future in view of the local demand for paper which is now being supplied from abroad, and because of the abundance in the Philippines of raw materials for paper.

Ceramics.—As a result of studies in local clays it has been found possible to cover red burning clays such as Pasig and Tinajeros with a white body. This makes it possible to manufacture locally white tiles, the large demand for which is at present entirely supplied by foreign tiles, mostly from Belgium and Japan. During the latter part of the year considerable time was devoted to the preparation of a ceramics exhibit for the Philippine Carnival Exposition of 1934. Samples of art pottery, glazed and vitrified wares, tiles, fire bricks, sewage pipes, and sanitary wares made from Philippine materials, were prepared.

Paints and oils.—Experimental work on aluminum paints, metallic paints, and the use of lime as a stabilizer for bleaching powder has been completed and is now under preparation for publication.

The manufacture of oil cloth and linoleum from lumbang oil is in progress.

Cement.—The experimental work on the suitability of the raw materials found in the vicinity of San Fernando, La Union, for the manufacture of Portland cement was continued during the early part of the year. It is hoped that this work will be completed in 1934.

CHEMICAL RESEARCH

Industrial products.—The prosperity of a country depends upon the growth of industries. The Philippines are rich in natural resources but comparatively few industries have been well established. For a number of years the Bureau of Science has been conducting research experiments with the idea of developing the natural resources of the Philippines. Basic data suggesting promising prospects for the promotion of numerous industries have been obtained. The results are published in the Philippine Journal of Science. In some instances laboratory investigations have been developed commercially, for now there are factories that make, from local raw materials, paints, varnishes, cement, and other industrial products.

Rice bran.—The investigation of Philippine rice-mill products, particularly rice bran, was finished and published during the year. This publication contains, in addition to a literature review, the laboratory data on four investigations; namely, Philippine rice mills, deterioration and preservation of rice bran, and a method for testing fat-splitting enzyme activity.

Composition of tropical woods.—Work on the composition of tropical woods was continued in coöperation with the Bureau of Forestry. Industries, such as those which manufacture rayon and other products from cellulose, use wood as their basic raw material. For such industries the composition of wood is a matter of considerable importance. It has been estimated that the virgin forests of the Philippines cover about 40,000 square miles and there are more than 2,500 species of trees. As yet, no systematic chemical analysis of tree species growing in the Philippines has been made. It, therefore, seemed desirable to analyze some of the more common and well-known types of trees in order to ascertain their composition.

Tan barks.—The investigation of Philippine tan barks was continued in coöperation with the Bureau of Forestry. Considerable data on barks of different species of trees were obtained. Tannin extracts were prepared from various species of tan barks. Leather tanned with these extracts gave very satisfactory results.

Vegetable oils.—There are various classes of vegetable oils obtained from Philippine trees or plants. These vegetable oils serve as raw materials for numerous industries, such as the manufacture of foods, medicinal preparations, perfumes, paints and varnishes. Work on the composition and characteristics

of Philippine vegetable oils was continued to determine their suitability for various commercial purposes.

Colobot essential oil.—Research on colobot essential oil (from *Citrus hystrix* DC. var. *torosa*) was finished. This fruit resembles the lime in appearance. It grows wild and is also cultivated in Batangas Province. The essential oil obtained from the peel of the fruit has a very fragrant and refreshing (lime-like) fruity odor and should serve as a useful constituent for making perfume bouquets.

Vitamins in Philippine foods.—Investigations on the vitamins in Philippine foods were continued. There is relatively little information available concerning the vitamin contents of Philippine vegetables, fruits and sea foods. These foods constitute the principal diet of the Filipino masses and therefore scientific data on the proper selection of Filipino foods is desirable.

Nutritive value of foods.—The nutritive protein value of five varieties of Philippine rice was determined, and experiments on the chemical and biological analyses of tikitiki extracts were finished. Results on the vitamin (A, B, and C) contents of various Philippine fruits and vegetables were also obtained for publication, and various brands of milk were analyzed for their calcium, phosphorus, and iron contents. Determination of the nutritive value and mineral constituents of the internal organs of animals, such as cows, pigs, and chickens, is now in progress.

Plant chemistry.—Work on the determination of calcium, phosphorus, and iron in Philippine food plants was undertaken. More than 450 samples of vegetables, fruits, and seeds have been analyzed. The partition of nitrogen in rice bran, polished and unpolished rice, was also investigated as well as the papain content of green and ripe papaya fruits. The quinine content of various species of Philippine cinchona was determined in coöperation with the Bureau of Forestry and the composition of some cattle feeds was worked out in coöperation with the Bureau of Animal Industry.

BIOLOGICAL PRODUCTS

Rat-bite fever.—The research work done during the year covered a wide field, special attention having been devoted to problems in experimental medicine, serology, bacteriology, and animal parasitology. Inquiries made into the transmission of experimental rat-bite fever among rats have shown that the disease is not transmitted by blood-sucking parasites, such as

fleas, but that it may be conveyed by the ingestion of the organs and blood of recently dead infected rats. This finding explains to a certain extent the propagation of the disease among rats by the cannibalistic habits of these animals.

Life cycle of Euparyphium ilocanum.—The life cycle of *Euparyphium ilocanum*, an intestinal fluke of man in the Philippines, was reinvestigated, and the findings reported last year were verified. Aside from its purely biological importance, this knowledge of the mode of development of the parasite is of practical significance in that it suggests how easily human infestations with the worm may be prevented.

Bactericidal property of lime.—The bactericidal property of lime against pathogenic bacteria was studied in connection with the use of this chemical in the treatment of the Manila water supply from Novaliches. The results of the experiments have shown that the amount of lime ordinarily used by the Metropolitan Water District is insufficient to destroy pathogenic organisms like those used in the experiments.

Hexylresorcinol.—Studies on the anthelmintic property of hexylresorcinol against the common intestinal parasites of man have shown that the drug possesses a high degree of efficiency against ascaris and hookworms. There are many well-known drugs which are as efficient against these parasites, but, because they possess a certain amount of toxicity and contraindications which only a trained person can recognize, they have the disadvantage in that their use must always be supervised by a physician. Hexylresorcinol, on the other hand, appears to be nontoxic to man and the indications are that it can be used safely even by the layman as a popular household remedy.

Other problems.—Further studies on the parasitic fauna of Philippine vertebrates resulted in the identification of additional species of trematodes, nematodes, and acanthocephala which are new to science. Other problems taken up during the year include a serologic study of cerebrospinal fluids in Philippine monkeys inoculated with yaws, syphilis, or both, and investigation of the duration of the serologic reactions in monkeys inoculated with yaws or syphilis, and inquiry into the effect of neosalvarsan treatment on the later serologic reactions of Philippine monkeys inoculated with yaws or both yaws and syphilis, a quantitative survey of human infestations with ascaris, trichuris and hookworm in different parts of the Philippines, and a serologic differentiation of human blood from monkey blood.

NATIONAL MUSEUM

Botany.—Work on the compilation of historical, scientific, and folklore accounts of Philippine native drugs and plants as well as research on the medicinal and nutritive values of Philippine plants was continued. Work on the Orchidaceae was continued and the data are now available for the publication of a book on Philippine orchids. The publication of an encyclopædic account of Philippine useful plants is well under way. Efforts are also devoted to the study of edible and poisonous mushrooms in the Philippines and their methods of artificial cultivation. Cooperation in the survey of plants causing hay-fever was extended to the United States Army Medical Board.

Miscellaneous.—On account of the work of arranging the display collections and labeling exhibits, no research work was done extensively. However, the technical employees started working on particular problems. The following are some of the problems on which they are working: Molluscan fauna of Manila Bay, Yogads of Isabela, geology of Puerto Galera and vicinity, some methods of circumcision in the Philippines, the Pagan Tagalogs of Sta. Inez, a new tarsonemid mite, and some new species of the family Cœnagriidæ (*odonata*).

MALARIA INVESTIGATION

Avian malaria.—Research was conducted on the biology of the parasite of avian malaria in *Culex* mosquitoes and the experimental epidemiology of avian malaria.

Human malaria.—A total of 1,081 blood smears have been taken in connection with malaria surveys during the year. Of the 822 slides examined at the time of this report 185 were positive. Spleen palpations have been made on 932 children, 241 being positive.

The following mosquitoes have been dissected for salivary gland infections with malaria: *A. minimus* var. *flavirostris* 3,124, *A. mangyanus* 157, *A. filipinae* 1,196. Total 4,477. Of these 10 *A. minimus* var. *flavirostris* were found infected.

A survey was made of all available netting materials in the Philippines, both of foreign and local manufacture. It was concluded that the best netting available is the locally made abacá sinamay cloth. Experiments determined that it should have a mesh of not less than 16 and not more than 20 holes per linear inch in any direction. Single nets may be made for as little as ₱1.50. Double nets and room nets may be used.

In coöperation with the College of Engineering, University of the Philippines, an automatic distributing machine for Paris green has been developed and is now being subjected to field test. It is motivated by a paddle wheel and is designed to reduce the costs of malaria control. It can be constructed for about ₱5.

Some 275 drawings have been completed for an identification chart for anopheline larvæ to be used by malaria inspectors and health officers in the provinces.

A new earth-line trap has been developed which is proving very useful in catching adults of the shy *funestus-minimus* subgroup of *Anopheles*.

A history of malaria in the Philippines from 1898 to 1933 with a complete bibliography has been prepared.

A history with complete bibliography has been prepared to show the noteworthy research record of the Bureau of Science in the fields of biology and medicine.

Preliminary experiments with stained mosquitoes were carried out in Calauan to determine the flight range of the important *funestus-minimus* subgroup.

U. S. ARMY MEDICAL DEPARTMENT RESEARCH BOARD

The investigations of the character and effects of tropical sunlight were brought to a close. A study of the bacteriologic, chemical, and biologic properties of reconstituted milk was completed. Studies of equine trypanosomiasis were continued and the blood chemistry findings were submitted for publication as the first paper in the series. Research problems in the fields of malaria, yaws, and smallpox vaccines, among others, have been initiated.

4. BUREAU OF FORESTRY

General statement.—Silvicultural research undertaken by the Bureau of Forestry comprises activities on experimental plantations, forest nurseries, and planting of ornamental trees. The Bureau keeps a collection of entomological specimens in connection with its work on forest entomology. A fungi collection representing different fungus varieties is maintained. Valuable data on timber seasoning are secured and studies are made on kiln drying lumber. The construction and operation of kilns for controlling sapstain are studied. Tests on the stability of wood are pursued as well as leaching tests, shrinkage tests, and other mechanical tests. Durability tests include compilations

of tests on untreated wood resistance and tests on resistance to wood borers. The testing of wood preservatives intended for use on a commercial scale is carried out. The finding of Philippine wood substitutes for articles made of foreign woods is another activity of the Bureau. Researches in wood technology are conducted upon request of lumbermen and wood users in general. Investigations on minor forest products embraced experiments on charcoal manufacture, tests on barks and roots of medicinal value, studies on latex of various *Ficus* species as well as on the manufacture of paper and pulp. Experiments on various barks of mangrove trees are made to determine their tannin qualities, and an experimental quinine plantation is maintained to determine the possibility of manufacturing quinine on a large scale in the Philippines.

The urgent need of basic data obtained through research has been felt more seriously than ever. The complexity of forest administration in the Islands resulting from the constant demands made upon the public forest and the lack of basic data badly handicapped this Bureau. Some species were reported as being overcut and fastly disappearing, and unless the silvicultural requirements of these species are known, no amount of cutting regulations will help perpetuate their existence. Some of these species have been overcut in spite of the application of the diameter limit as a protective measure. It is, therefore, necessary that sample plots be established in various parts of the Islands where forest conditions vary. As forestry work in the Islands become more developed, the Government cannot very well overlook the importance of experiments and studies as a basis for its practice.

There were 113 research projects handled during the year. Twenty-two of these were completed. Twenty-three new projects were started, but twelve were dropped due either to transfer of personnel, lack of facilities and materials, or failure in field procedure.

Silviculture.—The data on experimental plantations were put in good shape and entered in record books, 145 of which have been properly indexed and labeled.

In the plantations 29.5 hectares were surveyed and 16,779 trees located. Crown maps of some of the groves in the plantations were prepared for study. There were planted 20,666 seedlings besides 462 liters of ipil-ipil seed, while 526 trees were removed through the process of thinning and 57.27 cubic meters

of logs and poles and 110.50 cubic meters of stacked firewood obtained from them.

The experimental forest nursery was improved. A nursery house was constructed; seed beds terraced; ornamental plots enlarged; and the main path lengthened, widened, and given new sand and clay surfacing. Besides, there were under construction at the end of the year a new seed house and an orchid house.

On December 31, 1933, the nursery inventory showed 53,614 seedlings as growing stock. The total number of seedlings, including ornamental plants handled, was 125,335, of which 16,542 forest tree seedlings and 27,119 ornaments were distributed free to various reforestation projects, other entities, and foreign countries. Only 145 seedlings valued at ₱19.97 were sold.

There were 7,489.642 liters of seeds of various species handled during the year as compared with 8,463.65 liters for last year. In the Philippines alone, 3,384.581 liters were distributed, and 416.98 liters to foreign countries. Of the 105 different exotic species received, 68 species or 64.76 per cent germinated and produced 4,621 seedlings.

Forest entomology and pathology.—The insect collection contains about 8,626 specimens representing 1,206 species, 540 of which, represented by 5,357 specimens, have been determined. In addition, there are still about 3,000 specimens not yet mounted. Ten rickers mounted with butterflies that are of economic importance to forestry were prepared. There were sent abroad for identification 259 specimens representing 60 species of insects. One hundred fifty-seven mounted specimens of different orders were placed in frame and donated to the Army in appreciation of its coöperation with the School of Forestry.

There are at present about 300 specimens representing 102 species of forest fungi collected from the Makiling National Park. The snake specimens were segregated; five species were identified as nonpoisonous and four species as poisonous.

Timber physics.—In timber seasoning valuable information was obtained through studies on the absorption of moisture of kiln-dried lumber. Studies were also made on the method of kiln-drying 2-inch boards with minimum harm to the lumber. The construction and operation of a new kiln for controlling sapstain were studied. A design of an experimental kiln to be constructed in the Forest School in Los Baños was prepared. Tests on the stability of woods were continued as new species not previously tested became available. The leaching tests,

which aim at finding suitable woods for liquid containers, were begun during the latter part of the year. Additional tests on shrinkage were carried out as materials not previously tested became available.

One hundred test-samples for mechanical tests, 2" \times 2" \times 30" in size, of some common woods donated by a timber concern were prepared for shipment to the New York State College of Forestry, Syracuse University.

Durability tests.—A compilation of old tests on untreated woods was completed with ipil which has been given a value of 100 per cent as basis of comparison. Other durability tests, including those of resistance to marine wood borers, were made during the year.

Testing wallboards for the Bureau of Public Works and for importers which has been carried on for several years was continued this year. Some of these, like "Canec" and "Don-nacona," were found resistant to termite damage.

Wood preservation.—Several wood preservatives for sale or intended to be sold in the market were tested. Among these were "Terminix," "Timborite," "Lignasan," and "Puksanay." A concrete dipping tank 2' \times 3' \times 20', for treating timber susceptible to damage by termites and decay was constructed. During the year 24A-treated material was used in a number of construction jobs. Help was extended to some mining firms in the proper method of treating mine timbers by the "open tank" process.

Industrial investigations.—The finding of Philippine wood substitutes for articles made of foreign woods such as xylophone, shuttles and bobbins, was continued. Several woods which possess physical characteristics similar to those imported were recommended.

Wood technology.—Lumbermen, furniture dealers, and other wood users, numbering 95, submitted about 400 specimens to the Bureau for identification, besides 1,000 samples identified outside the Bureau by technologists whose services have been requested.

There were made photomicrographs of 73 species of less known woods, from which negatives and from those previously prepared 1,319 prints had been made. Besides, there were prepared 52 negatives and 748 prints for various uses.

Minor forest products.—During the year 2,922 kilos of charcoal were produced, of which 2,304 kilos were sold, realizing thereby ₱115.20; 400.5 kilos were used in the nursery and in

the blacksmith shop. For the Chemical Warfare Service of the U. S. Army, 762 kilos of charcoal from coconut shell were manufactured.

Fresh fruits, botanical specimens, stems, barks and roots of medicinal and poisonous plants and latex of various species of *Ficus* were collected for use by various entities, both Government and private. Barks of salago, malubago and *Grewia* spp. for the manufacture of paper, and pulp, and barks of tangal, bacauan, pototan, and busain for analysis to determine their tanning qualities, were furnished the Bureau of Science. Samples of wattle (*Acacia decurrens*) barks grown in the Forestry plantations at Bukidnon were also sent to the Philippine Cutch Corporation for study. Several inquiries regarding the possibility of purchasing large quantities of *Derris* root have been received.

5. FISH AND GAME ADMINISTRATION

The following investigations and studies are being carried out or have been completed:

- (a) The *ipon* fisheries of the Provinces of La Union, Ilocos Sur, and Ilocos Norte;
- (b) The edible fishes of Manila;
- (c) The herring fisheries of Manila Bay;
- (d) Edible crustacea of Manila;
- (e) Observations and experiments on the cultivation of certain edible mollusks in Occidental Negros;
- (f) The rearing of pond fishes and factors related to their food growth and breeding;
- (g) Fresh water and marine fish fauna of northern Luzon;
- (h) The mullets of the Philippines;
- (i) The cast net as a deep-sea fishing appliance in Manila Bay;
- (j) The fishery industries of southern Samar;
- (k) Other investigations carried out in the government experimental fish farm at Hinigaran, Occidental Negros;
- (l) Food and feeding habits of the barred ground dove; and
- (m) Food and feeding habits of *Munia cabanisi*, a weaver bird, and of *Uroloncha everetti*.

6. DIVISION OF HOME ECONOMICS

Researches were made on the preparation of coconut and banana with the end in view of increasing the local uses of these two popular and cheap native products. The researches

on coconut meat were carried out in order to help the coconut industry which is at present in a depressed condition.

Researches on green, mature, and ripe papaya were carried out, and preparations similar to imported ones were successfully made. A few of those worthy of mention are: red balls of green papaya made to appear and taste like the maraschino cherries, sauerkraut made from shredded green papaya, glacé green papaya similar to glacé cherries, and papaya chutney similar to Indian mango chutney.

Extensive experiments on dehydration of fruits and vegetables, preparation of fruits juices and fruit candies, and the freezing of various cheap foods like papaya, guanabano, and pineapple were made.

The canning and preservation of vegetables, meat and fish, especially native dishes which may have commercial possibilities, was continued. New dishes were prepared and canned satisfactorily.

7. DIVISION OF MINERAL RESOURCES

Whatever research or investigation work is conducted by the Division of Mineral Resources, it is of a nature inextricably linked with the regulatory work. However, the Division plans to embark on a more detailed study of the geology and mineral resources of the Philippines in order that those interested and connected with the development of the mining industry will be better assisted. Special attention will be given to the geology of gold and chromite and the investigation of clay deposits. The sharp decline in the prices of the major products of the Philippines such as abacá, tobacco, and copra has upset economic conditions, and the mineral industry may be called upon to stem the declining trade balance. It is intended to start a systematic geologic and topographic survey.

C. CONTROL OF PESTS AND DISEASES

1. BUREAU OF PLANT INDUSTRY

General statement.—Locust control work calls for the employment of large numbers of men and the purchase of poisons. New formulas for the destruction of the pest are being evolved. Poison bait and poison dust are being used with success, bagasse and rice chaff being experimented on for this purpose. Other methods employed in locust control work include catching of adults with nets, driving hoppers into pits, and spraying with soap solution.

The work on leaf-miner control is supplemented by research to ascertain the factors responsible for the periodical outbreaks of the pest. The "las-las" method of control is being employed. Infestation of coconuts by beetles is controlled by the use of soap spray and trapping. The distribution of parasites to control the leaf-miner infestation is proving a success. Work on larval parasitism increased.

The campaign against bud rot is maintained in spite of many handicaps. Control work on red and black beetles and stem bleeding diseases also demand attention.

The more common rice pests are cutworms, rice bugs, case worms and rats. Efforts to localize destruction by various methods of control are exerted. Calcium arsenate and poison baits are used effectively in the control of these pests. White arsenate is used to destroy rats.

Grubs of *Leucopholis irrorata* constitute one of the most harmful pests that attack sugar cane. Control work is undertaken in many localities.

Slug caterpillars are found to infest abacá plantations in Davao and the control measure adopted consisted merely in introducing parasites. A campaign is waged also against bunchy top.

Activities towards the control of mango hoppers are confined in mango producing districts. White ants and root grubs are destroyed by the use of calcium cyanide and carbon bisulphide.

The Bureau also engages in various other control activities like the campaigns against plant parasites, vegetable parasites and pests, and diseases on ornamentals.

LOCUST INFESTATION CONTROL WORK

Locust campaign.—With the funds appropriated this year for locust control work which made possible the employment of more men and the purchase of more poison, an increased vigor in the campaign was made possible. The use of new formulas of poison baits was a factor in the improvement of the locust situation during the year. Since June the infestation had gradually been so reduced that by the end of the year the total number of municipalities left infested was only 64, compared with 140 for 1932, or a decrease of more than 54 per cent. Large quantities of locusts were destroyed, amounting to 855 cavans of eggs, 322,735 of hoppers, and 47,244 of flyers.

Poisoned bait and poison dust.—The use of poison dust mixtures and poisoned bait, especially in the isolated areas, was

made more extensive since the beginning of the year. During May, 1933, preliminary trials were made with bagasse and rice chaff as bait. These were found to attract the hoppers.

Bagasse bait.—Extensive trials with bagasse were accordingly made in Occidental Negros where the material could readily be obtained in large quantities. The results were so very satisfactory that thereafter the bait was used extensively. Various sugar centrals coöperated in its preparation. The bait was prepared according to the following formula:

Bagasse	4 petroleum cans
White arsenic	1 salmon can
Molasses (mixed 50-50 by volume with water) 20-24 salmon cans depending on the moisture content of the bagasse.	

It was found that even the first stage hoppers ate the bait readily which killed them faster than the poisoned rice bran bait. Hence, with this bait the hopper infestations were controlled more promptly.

The bagasse bait soon after was also used extensively in Oriental Negros. To save money and to facilitate the campaign a mixing plant was set up at the Bais Central and the bait was prepared on a coöperative basis, the central furnishing the bagasse and the molasses as well as other facilities, and the Bureau of Plant Industry the labor, the white arsenic, and the direction and supervision, as in Occidental Negros.

Rice chaff bait.—The rice chaff bait, which took the place of the rice bran and the dust mixtures, was prepared mostly at the Central Office, Manila. Occidental Negros, however, prepared most of the dust mixtures employed there.

Green baits and other methods.—In many of the provinces, attractive green baits, such as those prepared from corn leaves, cane leaves, wild cane leaves (*Saccharum spontaneum*) and bamboo leaves, were employed. These were dusted with calcium arsenate, and then placed in front of moving bands of hoppers. Leaves of banana and of "kaong" (*Arenga saccharifera*) were also employed in some provinces.

The catching of the adults with nets, corralling and driving hoppers into pits were carried on as usual in all the provinces infested. In Negros and elsewhere some haciendas continued the use of soap spray, entirely at their own expense.

Damage by locusts.—During 1933, a total of 10,243 hectares of rice and 18,659 hectares of corn were reported totally damaged

in 18 provinces. In fifteen provinces 7,069 hectares of sugar cane were destroyed, whereas in 13 provinces 308,746 coconut trees were damaged. On the basis of figures on production and cost given in the 1932 statistical Handbook of the Department of Agriculture and Commerce, the value of the destroyed crops during the year was estimated approximately as follows:

Rice	P479,000
Corn	335,000
Sugar cane	466,000
Coconuts	77,000
Total	P1,357,000

Campaigns save country P4,000,000.—If it were not for the campaigns made the destruction would have been greater. Locusts would have reached Luzon and the damage would have been incalculable. The campaign prevented the formation of still bigger swarms. As a consequence, in practically all the infested provinces the rice and corn crops for the year were generally regarded as about normal, in spite of the presence of the locust. While it is hard to give any approximate figure showing the value of the crops saved by the campaigns in all provinces invaded by locusts it may be conservatively estimated that the total value of the crops saved is about three times the value of the crops destroyed, or over P4,000,000.

THE COCONUT LEAF MINER

Control work lags.—The coconut leaf miner has become a chronic pest to coconuts, particularly in San Pablo, Laguna. Although the planters have been taught how to control the pest, practically all of them were not disposed to spend money on control work due to the low price of nuts and copra. To make matters worse the Government has been unable to give as much as was necessary for proper control work, as it still had to conduct fundamental research work, with the object of ascertaining definitely the factors that are responsible for the periodical outbreaks of the leaf miner.

Number of trees infested.—During the year, over 1,000,000 trees were inspected, of which about 488,976 trees were found infested with the coconut leaf miner. Infestation ranged from 0 to 468 pupæ per frond. Of the trees infested, about 150,155 were subjected to the "las-las" method of control (cutting off

heavily infested leaves) thus destroying approximately 629,330 eggs, 167,041,400 larvæ, 110,683,700 pupæ, and 9,128,900 adults.

In November, spraying with soap solution had to be resorted to due to the presence of numerous beetles. About 3,778 trees were sprayed, killing approximately 4,114,300 adults. Through trapping and beetling, approximately 646,750 beetles were killed. Most of these were caught in Calauan where beetles swarmed most.

Distribution of parasites.—About 410,400 larval parasites were liberated on about 70,500 trees in 170 groves. Egg parasites were liberated by means of leaflets in cages and hence no actual count of those liberated was made. Wire-screen cages were placed in egg-infested groves and leaflets taken from groves where egg parasitism was high were put in them.

Egg parasitism has always been moderately high in almost every grove infested, but not high enough to be relied upon as the sole means of control. Approximately one-half of the eggs laid, however, were parasitized in many sections.

Larval parasitism increased.—At the beginning of the year, the highest percentage of larval parasitism in San Pablo was 13. Search for a good source of parasites was not successful. The original supply of parasites this year came from Santa Cruz, where a high percentage of parasitism was noted. In San Pablo, in those groves where parasites were liberated, parasitism was increased until it reached a maximum of 40 per cent in February, 1933. In March it reached 52 per cent, a rather high percentage. Toward the end of this brood, however, when the pest was beginning to emerge, the percentage of parasitism decreased and in the next brood which was well in the rainy season, the highest percentage of parasitism was only 25.

Factors responsible for spread of the leaf miner.—While other factors, such as the objection of grove owners to our mechanical methods of control, standing crops in many coconut groves which prevented thorough application of the control methods, dispersal of beetles and adverse weather conditions were partly responsible for the rapid increase of the pest, the main difficulty in the year's campaign lay in the inability to maintain an intensive and, therefore, more effective campaign due to lack of funds. During the year (up to and including November 22, 1933) a total of ₱7,018.62 was spent in the coconut leaf-miner campaign.

THE COCONUT BUD-ROT

Control work.—The regular campaign against coconut bud-rot which used to be carried on yearly in several coconut-growing provinces, was temporarily stopped in 1930 because of the leaf-miner outbreak, and later by the locust infestations in Mindanao and in the Visayas.

Early in May, 1933, it was noted that considerable numbers of coconut trees in Abu, a barrio of Majayjay, Laguna, were affected with bud-rot. Five inspectors were detailed to conduct a rigid campaign against the malady.

Degree of infestation.—Out of 621,745 trees inspected in Cavite, Laguna, Batangas, and Occidental Misamis, 6,404 were infected with coconut bud-rot, 6,108 of which were found in Cavite. A total of 3,534 trees with bud-rot were destroyed in Cavite and 281 in Batangas and Occidental Misamis during 1933. The remaining infected trees are being disposed of as fast as possible.

OTHER COCONUT PESTS AND DISEASES

Along with the coconut bud-rot control work, red and black beetles and stem-bleeding diseases of coconuts also demanded attention. A total of 502 cases of red beetles were found, 81 of which were destroyed and the rest treated; 781 cases of black beetles were reported, of which 103 cases were destroyed and the rest treated; and 75 cases of stem-bleeding disease were also reported and treated.

RICE PESTS

Cutworms and other pests.—Cutworms (*Spodoptera mauritia* and *Prodenia litura*) infested about 230 hectares of rice seedlings in Sorsogon, Occidental Misamis, Batangas, Bulacan, Nueva Ecija, Cagayan, Tarlac, Laguna, and Mindoro. The infestation was controlled with the use of calcium arsenate dust and poison baits in addition to actual hand picking. In Nueva Ecija about 200 petroleum canfuls of worms were destroyed and in Occidental Misamis about 12 canfuls.

Scheenobius incertellus and *Scirpophaga innotata* were also found destructive in the above-mentioned provinces. The destruction, however, was localized. In Bulacan alone about 2,000 hectares of irrigated rice and 25 hectares of upland rice were infested. Farmers were advised of the usual control measures to minimize the damage.

Rice bug (*Leptocorisa acuta*) infested about 51 hectares in Occidental Misamis, destroying about 20 per cent of the crop. Slight infestations were also reported from other provinces. Serious damage was averted by trapping the insects with the aid of light to which they are attracted or by catching them with nets.

The rice case worm (*Nymphula*) appeared in alarming proportion in the municipality of Sorsogon, destroying an area of about 30 hectares of young rice plants.

Rats.—Rats attacked both upland and lowland rice fields in the Provinces of Sorsogon, Bulacan, Cagayan, Laguna, Mindoro, and Surigao, causing 10 to 50 per cent damage in the infested areas. The use of white arsenic prevented more damage in many places.

SUGAR-CANE PESTS

Grubs of the toy beetle (*Leucopholis irrorata*) damaged cane fields in the municipalities of Balayan, Tuy, and Lian, Batangas. A vigorous collection campaign under the bounty system was conducted with the coöperation of the local officials to put the pest under control. About 966 petroleum canfuls of the beetles were collected. In Calumpit and Pulilan, Bulacan, rats were reported to have damaged considerable areas of cane fields. The varieties Badila, Superior, and Mauritius were the worst affected. Farmers were advised to use white arsenic poison to fight the rodents.

ABACÁ PESTS AND DISEASES

Slug caterpillar (*Thosea sinensis*) again infested the abacá plantations in the municipalities of Davao and Guianga, Davao. Fortunately, however, natural enemies (parasites) of the pest were present, preventing the necessity of resorting to artificial control measures.

Plants affected by bunchy-top were again noted in Davao during the year. Although the disease was not serious, campaign was immediately waged to get rid of all the affected plants to prevent spread.

PESTS OF FRUIT TREES

Mango hoppers (*Idiocerus clypealis* and *Idiocerus niveospar-sus*) were partly responsible for the failure to produce fruit of about 60 per cent of the mango trees that bloomed during the year in Bulacan. The pest was also reported prevalent in Ilocos

Sur, Zambales, Pampanga, Rizal, Cavite, Cebu, and other provinces where mangoes are found.

A species of fruit fly (*Dacus* sp.) was reported troublesome to jack fruits in places in the Province of Cagayan.

Seedlings of fruit trees in Tankulan, Bukidnon, were attacked by white ants and root grubs (*Leucopholis irrorata*). Calcium cyanide and carbon bisulphite proved effective for killing the insects.

PLANT PARASITES

At least three species of plant parasites, (*Loranthus subalternifolius*, *L. haenkeanus* and *L. philippinensis*), were found abundant in Nueva Ecija where 3,102 pumelo and a number of mango trees were parasitized. About 1,200 trees were cleaned of the parasites during the year. *L. philippinensis* was also found abundant on lanzon trees in Laguna and a campaign against it was started immediately after the fruiting season.

VEGETABLE PESTS

Caterpillars of *Prodenia litura*, *Crocidelomia binotalis* and *Plutella maculipennis* were reported to have attacked cabbage, pechay, and other cruciferous plants in many places. Those of the last species were especially abundant at higher altitudes, as in the Trinidad Valley. Lead arsenate and other arsenicals are being used for combating the pests.

Flea beetles, especially *Phyllotreta* sp., were also found very troublesome in Manila gardens and in the nearby provinces. Soap and lead arsenate sprays proved effective against the pest. Nicotine dust also proved effective against the adults but the high cost of nicotine is a limiting factor in the extensive use of this remedy.

Other minor pests complained of include chrysomelid beetles on cucumbers, fruits flies, red spiders on mongo and other beans, plant lice, slugs, and mealy bugs.

PESTS AND DISEASES OF ORNAMENTALS

A noctuid caterpillar with white spots and reddish-brown extremities was reported very destructive to lilies in Baguio and in the Trinidad Valley. It has also been found present in Manila in addition to red spiders, scale insects, night beetles, leaf rollers, and a rust on roses.

PORT QUARANTINE

Plant Quarantine Law.—All orders under the Plant Quarantine Law, Act No. 3027, were strictly enforced, especially the provisions of Administrative Order No. 11, which prohibit the entry into these Islands of seed palay and all parts thereof in the raw or unmanufactured state, including rice chaff and straw which previously were often used for packing merchandise and other materials imported into the Islands. Much time was spent in dealing with a considerable number of violations against said order. A notice dated May 19, 1933, supplementing the order, was issued.

Administrative Order No. 12.—This order prohibits the importation of certain fruits and vegetables into the Philippines from countries and places infested with the Mediterranean fruit fly (*Ceratitis capitata*) except for certain purposes and under certain conditions; it has been enforced since June 14, 1933. This Administrative Order replaced No. 34-2 (Revised) issued by the former Bureau of Agriculture.

Work done.—A total of 1,331 boats from foreign countries were inspected in all ports of entry from January 1, 1933, to November 30, 1933. There were 58,627 parcels brought in by passengers with plant materials inspected, and 15,459 passengers arrived from all countries, 6,806 of whom came from the fruit fly infested countries.

RESEARCH ON PESTS AND DISEASES

Researches and investigations on plant pests and diseases are discussed at considerable length in this report under "Research Work."

2. BUREAU OF ANIMAL INDUSTRY

General statement.—Rinderpest engages the attention of this Bureau and considerable time and money is spent towards its control and eradication. The complete eradication of this disease is almost at hand, but lack of men has put off this eventuality for a few more years.

The work of stamping out foot-and-mouth disease is another activity which demands the attention of the Bureau's personnel. Control measures adopted by the Bureau generally elicit protests from cattlemen and persons engaged in the cattle trade, but those are usually overcome.

Other cattle diseases like hemorrhagic septicemia, anthrax, and surra also levy considerable tolls from the animal population. The Bureau exerts efforts to control these diseases. Glanders, tuberculosis, and other diseases have likewise engaged the attention of the Bureau.

Researches and investigations on animal diseases are discussed at length in this report under Research Work.

RINDERPEST

Handicaps to campaign.—The diminishing appropriation for animal diseases has handicapped the campaign for the complete eradication of rinderpest this year. The small personnel has been constantly engaged, and whenever sickness or other very urgent reasons made it necessary for some members of the force to go on leave the effect has been a noticeable decrease of efficiency. In other words, the danger point of a very much reduced personnel has been reached. Although the disease has been kept in check, on two occasions it was not possible to prevent somewhat heavy losses on account of the shortage of personnel. The necessary concentration could not be made at the proper time at the danger points without neglecting other work equally important.

One of these cases occurred in Kabankalan, Occidental Negros. While the various parties in that province were scouting in the southern part of the municipality of Cauayan, an undiscovered focus of rinderpest infection in the interior of Kabankalan spread out to the hacienda nearest the interior, and caused considerable loss among susceptible animals that had just arrived from Masbate before the necessary concentration of men could be made to institute prophylactic vaccination.

The other case was the outbreak in Cagayan Valley, during the latter part of April, in the municipality of Enrile, Cagayan, from hidden infection that broke out in the common pasture lands, in the unsettled lands west of that municipality, and Sta. Maria and Cabagan, Isabela Province. Here again, prophylactic vaccination could not be done promptly. The delay was aggravated by the circumstance that it was the dry part of the year, when the animals were congregated in rather large numbers in the few watering places. Thus, a big number of animals were exposed. After the first rains of May, people needed their work animals for plowing, and when they caught them and took them to their respective barrios the disease was widely

scattered, spreading as far as Ilagan, Isabela, at the close of the year.

Rinderpest toll.—There were, during the year, 529 cases and 297 deaths. Although there has been an increase of 333 cases and 158 deaths over the figures of last year, there has been no general outbreak. The disease has been localized in the unsettled, sparsely populated districts where animals are kept loose in cogonales or bushy pastures where the muster of animals is difficult, and equally difficult to gather men to round up animals for vaccination from among farmers who were busy attending to their rice fields during planting season.

The following statement showing the provinces and municipalities infected during the year, indicating the dates of infection and release, will show that the disease was held under control. There were infected during the year four provinces and fifteen municipalities. At the end of the year there remain infected two provinces and three municipalities.

Provinces	Municipalities	Date infected	Date released	Date reinfected	Date of last case	Date released
Cagayan.....	Enrile.....	April 28	.....	.....	Aug. 8	September 16.
Isabela.....	Cabagan.....	June 8	.....	.....	Nov. 7	December 28.
Do.....	Santa Maria	June 20	.....	.....	June 20	July 30.
Do.....	Tumauini..	Sept. 7	.....	.....	Oct. 15	December 28.
Do.....	Ilagan.....	Dec. 22	.....	.....	Dec. 30	.....
Occidental Negros..	Ilog.....	Jan. 23	.....	.....	Mar. 10	April 28.
Do.....	Kabankalan..	Feb. 21	.....	.....	April 12	June 30.
Do.....	Cauayan.....	Sept. 26	Mar. 6	Sept. 9	Sept. 9	October 28.
	(1932)					
Oriental Negros..	Ayuquitan..	Mar. 10	.....	.....	April 4	May 30.
Do.....	Tanjay.....	Feb. 29	.....	.....	Mar. 27	April 29.
Do.....	Ayungon.....	June 8	.....	.....	June 19	July 30.
Do.....	Yayasan.....	June 9	.....	.....	June 27	August 30.
Do.....	Tolong.....	Oct. 13	.....	.....	Oct. 26	December 16.
Do.....	Manjuyod..	Nov. 15	.....	.....	Dec. 29	.....
Do.....	Bais.....	Dec. 26	.....	.....	Dec. 26	.....

FOOT-AND-MOUTH DISEASE

Cases and deaths.—Foot-and-mouth disease cases and deaths in eleven provinces this year amounting to 26,030 and 346 respectively are about double those in seven provinces in 1932 which amounted to 17,196 cases and 261 deaths. Named in the order of the number of registered cases, the eleven infected provinces in 1933 were Masbate, Bukidnon, Occidental Negros, Oriental Misamis, Lanao, Occidental Misamis, Sorsogon, Rizal, Zamboanga, Oriental Negros, and Leyte.

With the exception of a few cases in dairy cattle and swine, and the new outbreak in Occidental Negros, the disease was so mild that without a thorough and close examination of some herds

the infection could hardly be recognized. Due to this circumstance, doubt was expressed in certain quarters as to whether the mild lesions observed were not those of a mycosis or some other disease. Laboratory tests and further observation finally dispelled this doubt.

Emergency fund voted.—On account of the fact that many provinces were reported infected one after another, and in order to control its rapid spread (by clandestine movement of animals), ₱20,000 was authorized as an emergency fund which made possible the employment of 12 additional assistant veterinarians and 18 livestock inspectors in May. The increase of personnel resulted in the gradual decrease of cases in all infected provinces. At the end of the year, no more cases were registered in Lanao, Zamboanga, Bukidnon, Oriental Misamis, and Occidental Misamis. Leyte was released from quarantine on November 11, 1933. This was brought about by a more effective enforcement of control measures, such as quarantine and the regulation of traffic of animals for work, stud, and slaughter purposes.

Foot-and-mouth disease committee.—In addition to the employment of an emergency force, a foot-and-mouth disease committee was created for the purpose of studying and advising on the needed research work for the control and eradication of the disease. The report of the committee was discussed and latest knowledge on this disease gained.

Cattlemen protest quarantine.—Cattlemen and persons in the beef business affected by the quarantine restrictions protested, so compromise measures governing the shipment, handling, and corralling of animals from the infected provinces in Manila and Cebu had to be adopted "to give the cattlemen facilities to continue the business under the handicap of the pest." Not satisfied with the compromise regulations, the cattlemen were called together in a meeting to be addressed by the Director of Animal Industry to make them understand why no more favorable conditions could be granted without defeating the quarantine restrictions. This practically put to an end the continuous pressure of requests for the impossible, as the stand of the Bureau was then fully appreciated.

Negros infected.—When the disease was on the wane at the end of the year, the Government herd in La Granja, La Carlota, Occidental Negros, was infected at the middle of November through clandestine shipments of work animals from Masbate. The disease rapidly spread to the neighboring haciendas, and by the close of the year many haciendas in the towns of La

Carlota, La Castellana, Pontevedra, Isabela, and Hinigaran were affected by the pest involving 974 cases and 22 deaths. The infection in Rizal in March, April, and May, that in Leyte in June, and that in Sorsogon in August, September, and October, were introduced in the same manner from the same province. In Novaliches, Rizal, pigs and dairy cows were affected severely.

Through the efforts of our field force, violators of quarantine regulations, especially in Masbate, were convicted.

Indicative of the effectiveness of the present measures is the fact that no infection could be traced to shipments duly authorized by the Bureau this year.

HEMORRHAGIC SEPTICEMIA

Disease widespread.—Hemorrhagic septicemia outbreaks were registered in the following provinces: Antique, Bulacan, Cagayan, Camarines Sur, Cebu, Ilocos Sur, Iloilo, Laguna, Mountain, Nueva Ecija, Nueva Vizcaya, Occidental Negros, Oriental Negros, Pangasinan, Rizal, and Sorsogon.

Cases and deaths.—There were 897 carabao cases and 29 cattle cases with 763 and 26 deaths, respectively. The use of imported aggressin has been continued in haciendas in the sugar regions of Negros and Panay Islands at the expense of the hacenderos, while hemorrhagic septicemia vaccine manufactured by the laboratory of the Bureau was injected gratis in various provinces of Luzon and Cebu and Bohol Provinces.

ANTHRAX

There were reported 250 cases of anthrax in carabaos and 6 cases in cattle with the corresponding loss of 223 carabaos and 6 cattle, as compared with 502 carabao cases and 3 cattle cases with 468 and 3 deaths, respectively, the previous year. These cases and deaths were registered in the Provinces of Bulacan, Laguna, Nueva Ecija, Pampanga, Pangasinan, Rizal, and Tarlac.

A total of 11,518 carabaos and 530 cattle were given the simultaneous prophylactic treatment against anthrax.

TUBERCULOSIS

Cases among cattle and hogs were encountered at the Azcarraga Slaughterhouse and at dairy establishments of the City of Manila.

During the year, 132 head of dairy cattle, consisting of bulls, cows, and calves were tested for tuberculosis by means of an

approved method, and 6 were found positive. The intradermal method was used and the injection was made in the right caudal fold.

OTHER DISEASES

Surra.—There were reported during the year 104 cases of surra with 94 deaths in horses, 15 cases and 15 deaths in carabaos, and 1 case and 1 death in cattle. The provinces infested were: Bulacan, Cagayan, Cotabato, Masbate, Mountain, Nueva Vizcaya, Occidental Negros, Pampanga, Pangasinan, Rizal, and Tarlac.

Glanders.—Glanders broke out in mules in Fort Wm. McKinley in December. These were promptly destroyed.

Fowl diseases.—The educational campaign on preventive measures in the control of fowl diseases was continued during the year.

3. BUREAU OF FORESTRY

CINCHONA DISEASES

In April and May, a study was made on the Cinchona diseases at the Bukidnon plantation. Among the causal organisms found affecting the quinine plants is a species of *Diplodia* which can be considered as semiparasitic. It causes dieback of twigs and branches and is often found on cankers in the stems and roots of quinine weakened by poor or badly drained soil and other causes. *Fusarium* sp., *Gleosporium* sp., and two other sterile fungi were also isolated from roots of sick plants. *Pestalozzia* sp., *Gleosporium* sp., and *Phytophthora palmivora*, were obtained from the leaves. These pathogens are believed to infect the trees through broken branches or other wounds.

RUBBER TREE DISEASE

In the rubber plantation in the Forest School Campus two trees were found being attacked by a species of fungus, probably *Corticium salmonicolor*. The affected bark was superficially covered with pink patches of fungus tissue. The diseased trees were cut down in order to prevent the spread of the disease.

THREAD BLIGHT

One of the loquat trees, *Eriobotrya japonica*, in the old nursery was noted in an unhealthy condition. It was found that on the shady side of the stem, branches and twigs including the

lower surface of the leaves were covered with white strands of mycelium. The disease is known in India as "thread blight." The tree is still under observation.

INSECTS ATTACKING TREES

Insects attacking logs.—From sickly balso logs collected during the dry season, *Batocera numitor* Newn., *B. albofasciata* DeGeer, *Macrotoma* sp., and several species of *Platypodida* were obtained. These insects attack and kill medium and large sized trees. Besides, insect predators, such as *Prophthalmus tricolor* Wood, and larvæ of click beetles were obtained from the logs of infested trees. To control future outbreaks, the infested trees were cut down and disposed of properly.

Molave carpenter moth.—During the middle part of the year, *Duomitus ceramicus* Walk., was collected in great numbers from molave trees with the use of wire-screen traps fixed on the exit holes. The "molave carpenter moth" the female of which is capable of laying a large number of eggs, has a life cycle of two years. Its first emergence recorded was in the latter part of the dry season in 1931.

Tuai trees infested.—*Metanastria hyrtaca* Or. has been noted this year infesting tuai trees. The caterpillars congregate at the base of the host tree. At sunset, they climb the tree and at sunrise return to the base of the tree where they rest the whole day. They feed upon the leaves, defoliating the trees when in great number. Two methods of control were found effective: to collect and kill the caterpillars or apply sticky bands above the resting place on the trunk of the trees.

Avocado tree borer.—An avocado tree attacked by a species of ægeriid moth (avocado tree borer) was treated. The attacked parts of the base of the tree were chiseled out and the larvæ removed. A solution of paradichlorobenzine was injected into the holes to kill the remaining larvæ. The wounds were then painted with tar. The tree recovered and yielded a good crop of fruits.

PLANT QUARANTINE INSPECTION

There were inspected 31 shipments of various seeds and plants to foreign countries and the corresponding certificates of inspection issued. This work was carried on in coöperation with the Bureau of Plant Industry to which monthly reports were submitted.

D. GENERAL SERVICE

1. BUREAU OF PLANT INDUSTRY

General statement.—Aside from the extension service, research work, and pest and disease control which form the bulk of its activities, the Bureau of Plant Industry does little else in the way of general service. Matters not properly within the scope of any of the functional divisions are handled by the Office of the Director. The Plant Sanitation Division of the Bureau, besides its work in the control of plant pests and diseases, undertakes the study and recommends the promulgation of rules and regulations necessary for the prevention of the introduction of pests and diseases, enforces administrative orders regarding the importation, inspection, and quarantine of plant materials, and extends coöperation to the Bureau of Forestry, the Bureau of Science, and the Fish and Game Administration in the enforcement of laws, administrative orders, and regulations regarding the protection and propagation of beneficial animals, especially insectivorous birds.

Plant propagation stations.—The Bureau maintains a Division of Plant Propagation Stations which takes charge of all seed farms and plant propagation stations. Those are operated strictly on a business basis and are established at different places in the Islands, in order, to see good seeds of imported varieties of crops, to produce good seeds and plant materials for distribution, and to serve as demonstration units for improved farming methods and training grounds for extension agents; and secondarily, to provide facilities for the performance of final trials on economic plants under various climatic conditions.

There were 16 propagation station in operation during the year. The value of seeds and plant materials sold at the stations amounted to ₱58,303.38. Materials worth ₱10,260.17 were given free to farmers, and seeds and plants sent to provincial and municipal nurseries were worth ₱9,045.42, the total output, therefore, amounting to ₱77,967.79. At the close of the year there were still available seeds and plant materials valued at ₱21,836.36 for future distribution. The estimated value of standing crops is ₱216,744.76. There are 99,559 trees in permanent orchards, 45,621 of which are bearing. In addition to plant propagation, most of the stations also give facilities for field experiments to research workers.

The various propagation stations are: Lipa Coffee-Citrus Station, Tanauan Citrus Station, Lanao Horticultural Station,

Maligaya Rice Station, Ilagan Tobacco Station, Alabang Rice Station, Halcon Rubber Substation, Moriones Propagation Station, Gandara Seed Farm, Granja Sugar Cane Station, La Paz Propagation Station, Maridagao Rubber Station, Guingoog Lanzon Station, Guinobatan Propagation Station, Novaliches Mango Station, and Davao Seed Farm.

2. BUREAU OF ANIMAL INDUSTRY

General statement.—In line with its objective of developing the livestock industry in the Islands, and along with its other functional activities, the Bureau of Animal Industry exercises general supervision over animal importations into the Islands as well as importation of meat products. The local movement of livestock is likewise supervised and regulated by the bureau. Inspection fees collected on all kinds of animals arriving at Manila during the year amounted to ₱21,959.20, representing an increase of ₱432.20 over the previous year. Meat inspection in the slaughterhouses at Pandacan and Azcarraga was performed during the year.

Existence of cattle in corrals.—Due to the frequent outbreak of foot-and-mouth disease in the cattle corrals of Manila and vicinity during the year, it was decided to discourage the operation of such corrals outside the city that were not in a condition to prevent the leakage of infection. The corrals so closed included those at San Felipe Neri, Caloocan, Calaanan, and Malabon. The La Loma Corral was allowed to accommodate animals coming from uninfected provinces only.

Follow-up work.—During the latter part of the year a system of careful checking of animals arriving in the City of Manila from the provinces was inaugurated. The checking-up work consisted of a brief history of every shipment to the City of Manila from the provinces. This method not only resulted in a better collection of inspection fees but also made the control of animal movements effective, thus preventing sick or exposed animals from being clandestinely brought to clean places.

Slaughterhouse case.—Toward the latter part of 1931, mainly to test whether or not the municipal governments have exclusive power over the establishment of slaughterhouses within their jurisdictions, the City of Manila on the one hand, and the Philippine Livestock Coöperative Association and this Bureau on the other, were involved in what was known as the Slaughterhouse Case. After court proceedings were instituted, the trial court, in a lengthy decision, decided the case in favor of the Cattle

Association and the Bureau. The City of Manila appealed the case, but the Supreme Court affirmed the decision of the trial court on December 13, 1923, thereby settling an important question affecting the cattle industry as well as the fortunes of the men who have invested their time and money in it.

3. BUREAU OF FORESTRY

General statement.—The regulatory work of the Bureau of Forestry comprises the issuance of special use permits for residential, fishpond, or grazing purposes, *cainġin* permits, and similar grants for the use of public domain under the administration of the Bureau of Forestry. Fees and rentals are collected for the issuance of all permits. The Bureau likewise takes a hand in the registration of ordinary land and cadastral cases by examining such lands and entering opposition against their registration if the vegetative cover of the lands desired to be registered warrants their retention by the Insular Government. Private woodlands are also registered by the Bureau, and forest claims and conflicts settled. Ordinary and gratuitous licenses to collect and use forest products are issued in connection with the general supervision over the lumber industry. The Bureau of Forestry undertakes the inspection and scaling of lumber, the latter work being done in cooperation with the Bureau of Internal Revenue. Forest surveys, mapping, and drafting are also a part of the general service rendered by the Bureau of Forestry. A working collection of Philippine wood specimens is maintained by the Bureau as well as an herbarium.

SPECIAL USES

During the year there were handled 8,403 special use permit applications. The status of these applications as of December 31, 1933, is summarized as follows:

Final action:

Certified to the Bureau of Lands	387
Certified to the Fish and Game Administration	382
Acted—permits issued	411
Rejected or cancelled	2,434

Pending final action:

Approved—pending payments of rental	457
Approved—pending issuance of permits	59
Acted—pending rejection or cancellation	586
Applications with reports pending action	379
Applications pending inspection and report	3,308
Total	8,403

Permits.—Exclusive of *cañgin* and fishpond permits, there were 2,581 special use permits and lease agreements in force in 1933 with a total area of 37,641.19 hectares as compared with 2,647 permits covering an aggregate area of 38,509.45 hectares in 1932, or a decrease of 66 permits and 868.26 hectares. Of the total number of permits in force, 432 were new and 1,679 were extensions or renewals, while 470 were renewed or issued in previous years to expire in 1933 or 1934. Filipinos hold 96.9 per cent of the number of permits and leases in force, Americans, 1.7 per cent and other nationalities, 1.4 per cent. During the year, 291 permits were cancelled either through the request of the permittees or because the corresponding areas had been included in the alienable disposable land.

There were 2,029 *cañgin* permit applications handled, of which, 1,441 applications covering 2,852.98 hectares were acted upon favorably and 561 were disapproved, leaving 27 applications pending at the end of the year. Of the applications approved, 1,267 were in public forests, 170 in privately claimed lands, and 4 in areas covered by leases or homesteads.

Rentals.—The collection of rentals, back rentals, and surcharges amounted to ₱27,249.32 as against ₱39,888.55 in 1932, or a decrease of ₱12,639.23.

Twenty-three cases involving ₱7,152.70 of back rentals were referred to provincial fiscals for judicial action. Two cases were returned with favorable court decisions, one of which, involving ₱280, has been fully paid.

FOREST LAND REGISTRATION CASES

Expedientes covering 2,874 ordinary land and 166 cadastral cases involving 31,069.6008 hectares and 386,382.9033 hectares, respectively, were received during the year from the General Land Registration Office. Opposition to the registration of 87 lots in ordinary and 9,829 lots in cadastral cases involving 5,779.2456 and 165,328.7158 hectares, respectively, was sustained in courts.

PRIVATE WOODLAND REGISTRY

Out of the 56 applications for registration under section 1829 of the Revised Administrative Code received during the year, 28 forestry certificates of registration were issued covering 30 parcels with a total area of 1,758.7645 hectares as against 49

Association and the Bureau. The City of Manila appealed the case, but the Supreme Court affirmed the decision of the trial court on December 13, 1923, thereby settling an important question affecting the cattle industry as well as the fortunes of the men who have invested their time and money in it.

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There were 2,029 *cañgin* permit applications handled, of which, 1,441 applications covering 2,852.98 hectares were acted upon favorably and 561 were disapproved, leaving 27 applications pending at the end of the year. Of the applications approved, 1,267 were in public forests, 170 in privately claimed lands, and 4 in areas covered by leases or homesteads.

Rentals.—The collection of rentals, back rentals, and surcharges amounted to ₱27,249.32 as against ₱39,888.55 in 1932, or a decrease of ₱12,639.23.

Twenty-three cases involving ₱7,152.70 of back rentals were referred to provincial fiscals for judicial action. Two cases were returned with favorable court decisions, one of which, involving ₱280, has been fully paid.

FOREST LAND REGISTRATION CASES

Expedientes covering 2,874 ordinary land and 166 cadastral cases involving 31,069.6008 hectares and 386,382.9033 hectares, respectively, were received during the year from the General Land Registration Office. Opposition to the registration of 87 lots in ordinary and 9,829 lots in cadastral cases involving 5,779.2456 and 165,328.7158 hectares, respectively, was sustained in courts.

PRIVATE WOODLAND REGISTRY

Out of the 56 applications for registration under section 1829 of the Revised Administrative Code received during the year, 28 forestry certificates of registration were issued covering 30 parcels with a total area of 1,758.7645 hectares as against 49

certificates issued in 1932, covering 64 parcels with a total area of 4,526.0375 hectares. Thirteen applications were rejected because the areas desired to be registered were not covered with trees. In addition, there were issued during the year five provisional certificates of registration covering six parcels with a total area of 1,510.0372 hectares. On December 31, 1933, 15 applications were pending final action.

FOREST CLAIMS AND CONFLICTS

There were handled 1,262 forest claims during the year including those pending last year as against 1,311 cases in 1932. Out of these, 278 forest claims were decided. Twenty forest conflicts came up during the year, 17 cases of which were decided while the rest are still pending action.

UTILIZATION OF FOREST PRODUCTS

Ordinary and gratuitous licenses.—A total of 6,442 licenses were issued during the year as against 6,856 granted in 1932, or a decrease of 374 licenses. Of this number, 1,868 were ordinary timber licenses, 2,053 ordinary minor products, 2,232 private gratuitous, 130 public gratuitous, 65 minor's gratuitous, and 104 tobacco-curing house gratuitous.

Minor forest products license agreements.—There were in force during the year only two minor forest products license agreements. The applications for 20-year license agreements of the Mindanao Distilling Company and the Mindanao Lumber Company are still under consideration.

Free use.—In view of the low price of building materials coupled with the low cost of lumber many people have taken advantage of the free use privilege.

License bond deposits and fees.—During the year bond deposits amounting to ₱38,313.13 were forfeited while ₱78,794.22 were refunded. The total amount of fees collected on gratuitous licenses during the year including charges for certified copies of licenses, is ₱5,765.91.

LUMBER INSPECTION

There were 913,337 board feet of lumber and timber inspected during the year with inspection fees of ₱350.56 as against only

80,878 board feet with fees of ₱73.37 in 1932, or an increase of 1,029 per cent.

SCALING

There were 947,117.39 cubic meters (incomplete) with corresponding forest charges of ₱884,353.40 scaled during the year by forest officers as compared with 897,903.34 cubic meters with forest charges of ₱812,985.52 scaled in 1932, or an increase of 5.5 per cent.

Of the 110 sawmills and machine logging operations in force during the year, 68 were provided with regular scalers, while 15 were only visited periodically and the rest, or 27 mills, had no scalers at all. It was planned to check the utilization of these 27 mills whenever qualified men were available, but only 5 mills were actually checked during the year in view of the shortage of check-scalers.

Check-scaling.—The need of more check-scalers was more keenly felt than ever before. Out of the 14 forest districts, only 6 were provided with trained check-scalers.

Scaling in coöperation with Internal Revenue.—This Bureau coöperated, as usual, with the Bureau of Internal Revenue in checking lumber and timber shipments arriving in Manila. However, this coöperative work was confined only to minor shipments since the larger ones were entirely scaled by forest officers in Manila under section 1510 of Act No. 2711 as amended by Act No. 3938 approved on November 29, 1932.

FOREST SURVEYS

During the year, only amendment of the surveys, under the Bureau of Lands standards, of the Talavera River Watershed Reservation, of Nueva Ecija, and Albay-Sorsogon Forest Reservation, of Albay and Sorsogon, and the verification of the boundary line of Mount Makiling National Botanic Garden, were undertaken. However, there have been computed under the norms of the Bureau of Lands 13 solar observations and 1,373 cases of surveys involving 42,754 corners and traverse stations, and under the norms of the Bureau of Forestry, 405 lots with a total of 12,125 corners in connection with the preparation of technical descriptions of 155 cases of surveys. In addition, the forest surveys made under the norms of the Bureau of Forestry by the field personnel of the forest districts consist of 11,217.25

kilometers of field notes and 1,515.20 hectares of forest valuations with 3,195 sketches as compared with 14,963.55 kilometers, and 1,089.81 hectares of forest valuations with 3,767 sketches in 1932.

MAPPING AND DRAFTING

The classification of 656 maps compiled and traced is as follows: land classification, 74; national parks, 4; communal forests, 73; communal pastures, 11; timber forest concession, 1; minor forest concession, 1; forest reserves, 10; special maps, 7; and miscellaneous, 465, as against 902 last year. Blueprints and negatives prepared for administrative use totaled 13,665 copies of maps and sketches, as against 10,659 in 1932. Only 69 maps were sold, as against 103 the previous year.

The recording and cataloguing of all the maps of the Bureau have been continued, and 1,342 maps of different classes have been registered, as against 1,657 in 1932. These, with the 12,943 registered last year, bring the total to 14,285 maps at the close of 1933. Besides, there have been recorded 4,328 sketches or preliminary map data, as against 2,848 in 1932. With the 45,363 already recorded in previous years the total of sketches registered is 49,661.

WORKING AND FOREST COLLECTIONS

In the herbarium there are 4,098 mounted botanical specimens representing 153 families, 822 genera, and 1,700 species. Besides there are about 2,000 unmounted specimens representing 51 families, 140 genera, and 147 species available for exchange. To this there were added, during the year, 106 botanical specimens with 13 wood specimens. Of the 22 lot specimens and 38 planks received, 8 were made into permanent samples, and the others were turned into hand specimens, 735 of which were given away free and 87 sold abroad, while 432 specimens were sold locally and 695 were given free to lumbermen and prospective buyers of Philippine woods. The collection of foreign woods was increased by 132 new specimens.

The permanent wood collection of over 16,000 specimens comprising about 2,000 species of woods, was completely revised and relabeled, and a forest product exhibit was installed in the National Museum.

4. BUREAU OF LANDS

ADMINISTRATION OF PUBLIC LANDS

Public lands concession.—The following table shows the number of applications and area of agricultural public lands disposed of by homestead, sale, lease, and free patent:

Kind of applications	1932		1933	
	Number of applications	Area in hectares	Number of applications	Area in hectares
Homestead:				
Received.....	8,848	149,498.5104	7,861	134,032.8011
Rejected.....	5,377	94,705.6070	2,608	47,966.8204
Entries allowed.....	7,255	110,648.1490	5,011	78,393.0944
Cancelled.....	1,700	25,267.9340	3,217	44,166.8574
Patents issued.....	3,435	41,794.7912	4,310	53,079.5501
Reinstated.....	717	11,707.8743	748	13,186.7417
Pending.....	19,194	357,201.7598	20,102	376,903.5181
Sales:				
Received.....	1,140	44,374.6325	1,164	39,868.8864
Rejected.....	1,206	69,820.8083	808	39,708.6976
Awarded.....	337	13,021.0401	346	8,438.2956
Cancelled.....	98	4,176.5239	68	4,944.9406
Patents issued.....	80	978.1091	78	956.9671
Reinstated.....	101	5,857.4258	71	4,311.0674
Pending.....	4,149	228,140.0265	4,222	222,920.1336
Lease:				
Received.....	197	31,147.0349	182	15,198.4647
Rejected.....	329	82,417.2902	234	44,571.0000
Awarded.....	11	3,508.8145	6	334.8300
Cancelled.....	16	9,478.5968	9	2,237.4997
Reinstated.....	20	6,011.4973	8	2,579.2500
Pending.....	1,132	269,024.4604	1,080	241,828.3451
Free patent:				
Received.....	1,692	11,057.6928	1,601	10,807.7013
Rejected.....	698	4,680.1752	400	3,170.8788
Entries allowed.....	1,532	7,603.9263	1,068	6,008.7626
Cancelled.....	320	1,500.1561	507	1,589.8013
Patents issued.....	1,354	5,700.3104	1,607	7,232.8745
Patents cancelled.....	1	4154		
Reinstated.....	34	226.7304	15	132.9861
Pending.....	3,370	29,031.1597	3,516	30,788.2901

Public lands investigation.—A comparison of the work accomplished in public land investigation during the years 1932 and 1933 is given in the following table:

	1932	1933
Orders executed	26,406	29,767
Orders pending	17,855	16,175

Forfeited properties.—The administration and disposition of lands forfeited to the Government for delinquency in the payment of taxes, which formerly formed part of the functions of the Bureau, have been transferred to the provincial treasurer of the

province where the lands are located by operation of Act No. 3995.

DISPOSITION OF FRIAR LANDS AND SAN LAZARO ESTATES

Friar Lands Estates.—The Friar Lands Estates consist of 23 separate estates located in the Provinces of Bataan, Bulacan, Cavite, Cebu, Isabela, Laguna, Mindoro, and Rizal, comprising an aggregate number of 53,699 subdivision lots with a total area of 153,329.3821 hectares valued at ₱21,517,650.78.

The following statement shows the number and extent of friar lands sold up to and including December 31, 1933, representing 94.4 per cent of the total area of all the estates:

Total number of lots sold.....	52,182
Total area in hectares.....	144,946.2860
Total sale value	₱20,458,874.78

Sale of vacant lots.—During the year there were sold 60 lots with a total area of 662.5591 hectares valued at ₱52,715.13 as compared with 128 lots with a total area of 582.3133 hectares valued at ₱56,349.28 sold during the preceding year.

Lands sold and fully paid up.—In 1933 there was paid the sum of ₱12,023,610.39, representing the total sale value of 42,306 lots, covering an aggregate area of 70,066.6044 hectares, as against the sum of ₱1,544,210.33 representing the total sale value of 3,688 lots, covering an aggregate area of 8,686.1594 hectares, paid up in 1932.

Collections.—Notwithstanding the present monetary crisis, the collections during the year showed an increase of ₱48,184.76 over those for 1932. The increase obtained was the direct result of the campaign of serving personally individual notices on the purchasers who are in arrears, and also of filing civil suits against them. There have been served during the year a total of 1,534 notices on a like number of individual purchasers, and the Bureau has received payments for 597 lots.

Sources of income.—The collections from January 1 to December 31, 1933, derived from different sources, such as the payment of installments and interest on the purchase price of lots, irrigation fees, and miscellaneous receipts amounted to ₱315,835.81 as against ₱267,651.05 collected in 1932 from the same sources.

Summary.—A summary of the actual status of the lands sold and unsold with the 23 Friar Land Estates at the close of business on December 31, 1933, is shown in the following table:

	Number of lots	Area in hectares	Value
Lands sold and fully paid up	42,306	70,666.6044	P12,023,610.39
Lands sold and partially paid up	9,876	74,879.6816	8,435,264.39
Vacant and unsold lands	1,611	7,301.9797	986,674.00
Lands technically vacant being temporarily reserved for the Bureau of Animal Industry, Science, Forestry, and Constabulary	6	1,081.1164	72,202.00
Total	53,699	153,929.3821	21,517,650.78

Resurvey and reclassification of friar lands.—The field work of the resurvey of the Talisay-Minglanilla Estate by Survey Party No. 22-B stationed at Talisay, Cebu, was completed about the middle of November, 1933, and the computation work is now in progress. The Special Survey Party at Rosario, Cavite, is executing the subdivision of big lots into smaller parcels to attract prospective purchasers. This party is also in charge of the reconnaissance and survey of agricultural roads, of the preparation of plans of dams, reservoirs and gates, of the hydrographic survey of rivers and creeks to be dammed, and of the preparation of the profile and contour maps of irrigation ditches and roads in the Provinces of Bulacan, Cavite, Laguna, and Rizal.

The following tabulated statement shows the work accomplished during the year 1933:

Estate	Number of lots sub- divided	Area in hectares
Muntinlupa	4	.4851
San Francisco de Malabon	46	4.3265
Santa Cruz de Malabon	193	313.4769
Talisay-Minglanilla	639	1,227.0000
Total	882	1,545.2885

Friar land investment fund.—The operations of the Friar Lands Loans Fund are summarized in the following table:

Original operating capital	P100,000.00
Add—Total amount of interest on loans collected up to and including December 31, 1933	347,063.47
Total operating capital as of December 31, 1933	P447,063.47

DISTRIBUTION

Items	Number of contracts	Amounts	
Operating capital on January 1, 1933.		₱439,624.15	
Less—Total outstanding loans on January 1, 1933.	159	120,328.72	
Balance available for loans on January 1, 1933.			₱319,295.43
Add—Total collections from January 1 to December 31, 1933:			
(a) Repayment of principal.	35	32,567.24	
(b) Interest on loans.		9,029.82	41,596.56
Total available for loan on December 31, 1933.			360,891.99
Less:			
(a) New loans granted, 1932.	19	30,370.00	
(b) Advances for insurance and court fees.	8	102.09	30,472.09
Balance available for loan on January 1, 1934.			330,419.90
Add—Total outstanding loans December 31, 1933.	143		116,633.57
Total operating capital on January 1, 1934.			447,053.47

SAN LAZARO ESTATE

Disposition.—The present status of the disposition of the San Lazaro Estate is shown in the following table:

Total	Area	Value
	<i>Square meters</i>	
Total occupied lands with contract.	613,579.6	₱2,095,726.82
Total occupied lands without contracts.	420,951.0	1,484,178.00
Total.	1,034,530.6	3,579,904.82

Collections.—The total receipts from the administration of the San Lazaro Estate for 1933 amounted to ₱138,356.23, as against the receipts in 1932, which amounted to ₱181,736.37.

San Lazaro Investment Fund.—The transactions with respect to the San Lazaro Investment Fund from January 1 to December 31, 1933, are shown in the following table:

Items	Number of contracts	Amounts	
Original operating capital on January 1, 1933.		₱1,924,182.17	
Less—Outstanding loans on January 1, 1933.	342	₱1,821,390.90	
A/C 1217 Florencio Reyes closed to B-8-3, December 31, 1933.	1	8,425.94	1,829,816.84
Balance available for loan on January 1, 1933.			94,365.33
Add—Total collections from January 1 to December 31, 1933:			
Repayment of loan principal (closed account).	30	211,062.06	
Installments on properties sold (B-10-c).	8	5,311.00	
Installments on lots sold (E-39).		5,211.00	321,584.06
Total amount available for loan on December 31, 1933.			315,949.39
Less—Total disbursements from January 1, 1933, to December 31, 1933:			
New loans granted during 1933.	29	183,441.00	
Advances on insurance, court fees, taxes, etc.		4,895.62	
Philippine National Bank (bonds).		6,000.00	194,336.62

Items	Number of contracts	Amounts
Balance available for loan as on December 31, 1932.....		P121,612.77
Add—Outstanding loans on December 31, 1933.....	323	
Active loans (real estate) B-10.....	249	P1,348,379.93
Active loans (chattel mortgage, B-10).....	60	81,827.54
Foreclosed loans (real estate, B-10).....	14	77,348.05
P. N. B. (bonds) B-10-a.....		171,000.00
Forfeited properties owned by the Govern- ment (B-10-b).....	10	87,566.75
Forfeited properties already sold (account receivable, B-10-c).....	9	47,540.00
Total operating capital on January 1, 1934.....		1,935,270.04

CLAIMS AND CONFLICTS

Orders of investigation and reinvestigation.—The following table shows the total number of orders of investigation and reinvestigation issued during the years 1932 and 1933, as well as the number of reports during the same years for being defective or incomplete:

	1932	1933
Orders of investigation.....	1,357	1,136
Orders of reinvestigation.....	50	62
Reports returned for being defective or incomplete.....	11	32

Disposition of claims and conflicts.—There were 1,626 decisions rendered by the Bureau in 1933 as compared with 2,253 decisions rendered in 1932.

Disposition of motions or petitions for reconsideration.—The number of orders granting or denying requests for reconsideration as well as the number of orders suspending the effects of decisions and orders of execution of final decisions during 1932 and 1933, is shown in the following table:

	1932	1933
Orders granting requests for reconsideration of decisions and ordering investigation.....	157	75
Orders dismissing requests for reconsideration of decisions.....	276	188
Orders suspending effects of decisions.....	93	64
Orders of execution of decisions.....	59	43

Appeals to the Department.—There were 77 decisions of the Director of Lands appealed to the Department in 1933 as against 159 appealed in 1932.

The following comparative table shows how the decisions brought on appeal were disposed of by the Department:

	1932	1933
Affirmed or dismissed.....	116	59
Reversed or modified.....	18	11
Remained for reinvestigation.....	25	7

LAND REGISTRATION

Cadastral proceedings (Acts Nos. 2259 and 3327).—There were 50 petitions sent to the Solicitor-General for the institution of cadastral proceedings in 1933 as compared with 90 sent in 1932. In the petitions for 1932, 66,545 lots were involved with an area of 243,418 hectares, while in the petitions for 1933, 32,260 lots were involved with an area of 318,662 hectares.

Cadastral cases decreed in 1932 and 1933.—According to records of court decisions received in the Bureau, more cadastral cases were decreed in 1933 than in 1932 as shown in the following table:

Year	Cases	Lots	Area in hectares
1932	37	28,311	56,348
1933	61	45,966	129,882

Compulsory registration proceedings (sections 50 and 85, Act 2874).—Under the provisions of sections 50 and 85 of Act No. 2874, as amended, there were filed in 1933, 33 petitions for compulsory registration involving 77 lots covering 6,138.9962 hectares as against 24 petitions filed in 1932 involving 117 lots with an aggregate area of 1,521.3705 hectares.

Claims filed in regular cadastral cases.—The number of claims filed each year for the last five years by the Bureau in regular cadastral cases is as follows:

Year	Claims
1929	74
1930	101
1931	101
1932	109
1933	89

Claims filed in compulsory registration cases.—The number of claims filed in 1933 in compulsory registration cases, as well as the number of claims in such cases filed for the preceding four years, is as follows:

Year	Claims
1929	17
1930	26
1931	39
1932	24
1933	33

Examination of court decisions, orders, etc.—The decisions and orders of all the courts of first instance in registration cases of any kind—ordinary, cadastral, or compulsory—are examined

in the Bureau, to determine whether or not appeals from the same should be perfected. The number of such decisions and orders examined this year and in the preceding year is as follows:

Kinds of decisions and orders	1932	1933
Ordinary registration cases.....	2,568	2,613
Cadastral cases.....	4,731	4,268
Compulsory registration cases.....	149	163
Total.....	7,448	7,034

SURVEYS

Isolated land surveys ordered to public land surveyors.—Requests for isolated land surveys are received from various sources. In general, when the applicants are private individuals or enterprises that desire to have their lands surveyed for land registration or other purposes, they are referred to private land surveyors, but in many cases the survey has to be undertaken by the Bureau of Lands.

At the beginning of the year there were 10,437 surveys pending from 1932, while at the end of the year there were on hand 12,718 surveys which will be attended to during 1934.

Comparatively, the years 1932 and 1933 stand as follows in this matter:

Year	On hand January 1st	Ordered	Completed January 1st to December 31st	On hand December 31st
1932.....	10,928	6,416	6,907	10,437
1933.....	10,437	12,284	10,003	12,718

Survey returns received in Manila.—The number of survey returns received in Manila during 1932 and 1933 stands as follows:

Year	Private lands (A)	Public lands (A)	Miscellaneous lands (A)	Total (A)	Private lands (B)	Public lands (B)	Miscellaneous lands (B)	Grand total	
								Surveys	Parcels
1932.....	1,022	7,897	363	9,282	4,945	82	208	14,517	38,670
1933.....	824	8,723	456	10,003	3,112	89	262	13,466	25,525

(B)=Surveyed by private land surveyors.

(A)=Surveyed by public land surveyors and deputy public land surveyors.

Sketching on cadastral map sheets.—The number of surveys sketched annually on cadastral map sheets from sheets from

1931 to 1933, classified into private land, public land, and miscellaneous, may be seen from the following table:

Class of surveys	Year 1931		Year 1932		Year 1933	
	Surveys	Parcels	Surveys	Parcels	Surveys	Parcels
Private lands (A).....	8,391	14,448	3,860	6,454	1,964	3,265
Private lands (B).....	44	45	75	80	74	77
Public lands.....	3,636	3,770	4,318	4,461	4,346	4,422
Miscellaneous lands.....	124	127	31	31	56	58
Total.....	12,195	18,390	8,284	11,026	6,440	7,822

(A) = Surveyed by private land surveyors.

(B) = Surveyed by public land surveyors.

Computation on isolated land surveys.—The amount of computation work accomplished on all surveys, outside and inside cadastral projects, during 1932 and 1933, may be summarized as follows:

Class of surveys	Completed during 1932		Completed during 1933		On hand on December 31, 1933	
	Surveys	Parcels	Surveys	Parcels	Surveys	Parcels
Private lands (A).....	5,625	19,220	3,766	12,286	286	2,316
Private lands (B).....	167	334	130	232	11	16
Public lands.....	8,351	9,605	8,461	9,681	896	990
Miscellaneous lands.....	1,762	5,777	1,408	4,249	243	624
Total.....	15,905	34,936	13,765	26,448	1,436	3,946

(A) = Surveyed by private land surveyors.

(B) = Surveyed by public land surveyors.

Preparation of plans.—The number of plans completed in 1932 and 1933 and the number on hand on December 31, 1933, classified into private, public, and miscellaneous land surveys, are shown in the following table:

Class of surveys	Completed during 1932		Completed during 1933		On hand on December 31, 1933	
	Surveys	Parcels	Surveys	Parcels	Surveys	Parcels
Private lands (A).....	5,528	14,853	3,667	12,063	497	1,238
Private lands (B).....	475	1,512	659	2,905	43	64
Public lands.....	6,033	6,952	5,933	6,618	271	334
Miscellaneous lands.....	1,372	4,011	1,169	3,820	165	1,030
Total.....	13,408	27,328	11,428	25,406	976	2,666

(A) = Surveyed by private land surveyors.

(B) = Surveyed by public land surveyors.

Final platting on cadastral map sheets.—Classified into groups, the number of surveys finally platted on the cadastral map sheets from 1931 to 1933 is as follows:

Class of Surveys	Year 1931		Year 1932		Year 1933	
	Surveys	Parcels	Surveys	Parcels	Surveys	Parcels
Private lands (A).....	14,196	29,119	4,969	12,681	2,703	6,375
Private lands (B).....	818	4,304	365	3,187	155	541
Public lands.....	2,936	3,202	4,866	5,482	6,269	6,825
Miscellaneous lands.....	709	2,939	1,138	2,942	795	2,501
Total.....	18,659	39,564	11,336	24,292	9,886	16,242

(A) = Surveyed by private land surveyors.

(B) = Surveyed by public land surveyors.

Work on hand; isolated land surveys.—The following table shows comparatively in parcels the progress of the verification of isolated land surveys in the Central Office during the last five years:

Year	On hand	Received	Completed
1929.....	17,394	35,050	25,096
1930.....	27,348	35,691	39,127
1931.....	23,912	31,658	47,057
1932.....	7,566	38,670	28,402
1933.....	16,912	25,525	28,771
1934.....	13,306		

Surveys finally completed.—The work finally completed yearly on isolated and miscellaneous land surveys for the last five years, is as follows:

Year	Lots	Area in hectares
1929.....	25,096	199,576
1930.....	39,127	105,649
1931.....	47,057	225,075
1932.....	28,492	204,342
1933.....	28,771	185,320

Public land subdivisions.—In view of the enactment of Act No. 4031 appropriating the sum of ₱150,000 for the survey and subdivision of public lands in the Philippine Islands, the survey

and subdivision of the following public lands were inaugurated during 1933:

Province and municipality	B. L. number	Date of inauguration	Probable date of completion	Approximate—	
				Number of lots	Area in hectares
Agusan:					
Libertad.....	Pls-22	Oct. 25, 1933..	Apr., 1936..	1,500	5,000
Bohol:					
Carmen and Sierra Bullones...	Pls-4	Oct. 2, 1933..	Dec., 1934..	10	15,000
Bulacan:					
Angat.....	Pls-19	June 12, 1933..	June, 1934..	42	250
San Miguel.....	Pls-09	.....do.....	.....do.....	1,100	6,700
Isabela:					
Gamu and Ilagan.....	Pls-15	Feb. 20, 1933..	1937..	2,800	28,107
Nueva Ecija:					
Laur.....	Pls-16	March, 1933..	Nov. 20, 1933..	138	940
Papaya.....	Pls-17	.....do.....	.....do.....	63	453
Nueva Vizcaya:					
Casibu District.....	Pls-18	May 12, 1933..	June, 1934..	225	1,115
Occidental Negros:					
Cadiz.....	Pls-20	Sept. 1, 1933..	Apr. 30, 1933..	130	1,075
Sorsogon:					
Matnog.....	Pls-23	Oct. 5, 1933..	Dec. 26, 1933..	42	85
Total.....				8,050	58,725

OLD SUBDIVISION PROJECTS

Lanao:					
Kolambugan.....	Pls-12	Sept. 20, 1931 (1st loop)	Jan. 15, 1934..	1,010	12,200
Tayabas:					
Balec.....	Pls-11	Oct., 1930..	March, 1934..	824	1,900
Total.....				1,824	14,100
Grand total.....				9,884	72,825

Of the foregoing public land delimitation and subdivision projects, only those of Laur and Papaya in Nueva Ecija, and Matnog, Sorsogon, designated as B. L. Surveys Nos. Pls-16, Pls-17, and Pls-23, respectively, with the total of 253 lots and 1,478 hectares, were completed during the year 1933.

CADASTRAL LAND SURVEYS

Applications for cadastral land surveys.—There were 251 municipalities which have applied for cadastral survey prior to the year 1923, but which have not yet been requested to furnish new data for a revised estimate of survey costs. Since 1923, the following new applications have been received and acted upon as indicated herein:

Status	Municipalities
Forwarded to provincial treasurers for data.....	13
Forwarded to provincial treasurers for adoption of model resolutions by the provincial boards and municipal councils.....	81
Forwarded to the Secretary of Agriculture and Commerce for authorization of survey.....	7
Projects authorized by the Governor-General, pending inauguration	74

Cadastral surveys inaugurated.—No cadastral project was inaugurated in 1933. The following comparative table shows the amount of cadastral work inaugurated during the last five years:

Year	Number of lots	Area in hectares
1929.....	34,099	69,171
1930.....	50,089	82,530
1931.....	22,500	17,000
1932.....	19,138	209,000
1933.....		

Cadastral projects in progress in the field.—On December 31, 1933, the following were the projects in progress in the field:

Number of municipalities	Extent of projects		Surveyed	
	Number of lots	Area in hectares	Number of lots	Area in hectares
10.....	83,430	312,589	61,947	149,997

Projects completed in the field.—During 1933 the projects completed in the field involved 32,593 lots having a total area of 139,681 hectares.

Cadastral survey computations.—The following table shows the amount of work completed by the Section of Cadastral Survey Computations in 1932 and 1933:

Year	Cases	Lots	Area	Corners
1932.....	96	69,158	373,873	605,884
1933.....	49	39,344	154,272	317,553

Cadastral survey maps.—Compared with 1932, the work accomplished on cadastral survey maps during 1933, has decreased as shown by the following data:

Year	Number of cases	Number of lots	Area in hectares
1932.....	84	65,440	310,031
1933.....	60	40,739	221,538
Difference.....	24	24,701	88,493

The decrease was due to the suppression during the previous years of the inauguration of cadastral projects and to the re-trenchment policy adopted.

The following table shows in parcels the progress of the verification of cadastral surveys in the Central Office during the last five years:

Year	On hand	Received	Completed
1929.	115,108	69,425	69,271
1930.	115,238	52,796	72,748
1931.	95,286	88,528	143,051
1932.	40,763	43,939	65,440
1933.	19,262	42,056	40,739
1934.	20,579		

Progress of cadastral surveys.—The cadastral surveys completed in the field and submitted to the Manila Office during the period from 1910 to December 31, 1933, reached a total of 1,237 cases involving 1,057,089 lots and an aggregate area of 3,738,515 hectares.

Cadastral projects undertaken by private enterprises.—From February 24, 1921, to December 31, 1933, there have been undertaken by private surveying corporations under Act No. 2989, as amended, 119 cadastral projects, consisting of 127,465 lots with an aggregate area of 258,554 hectares.

Collection of cadastral costs.—The collection of cadastral costs during 1933 as compared with 1932 is as follows:

Year	Amount
1932	₱403,822.23
1933	394,933.16

5. BUREAU OF COMMERCE

General statement.—Substantial progress was made by the Bureau in the enforcement of trade regulation laws that are now in operation. This was made possible by a reorganization in the Bureau resulting from the general reorganization of the Department. The work of registering corporations, partnerships, trade-marks and trade-names was continued. Fees collected from these registrations amounted to ₱49,058.62 for 1933, or an increase of ₱3,588.58 over the collection for 1932. This increase was due mainly to the greater number of corporations registered during the year. Collections due the Rice and Corn Fund amounted to ₱113,424.30 as compared with ₱52,597.38 for 1932.

Registration of corporations.—There were registered 357 domestic corporations, and out of this number 49 were mining companies. Only two foreign corporations were licensed to transact business in the Philippine Islands. The amount

of ₱26,313.50 was collected as fees for the registration and filing of documents pertaining to corporations.

Data on mining corporations, such as capitalization, names of incorporators, board of directors, claims developed, value of property owned, etc. were prepared, and opinions on certain legal matters pertaining to corporations and other laws enforced by this Bureau were given.

Registration of partnerships.—There were registered 212 documents pertaining to partnerships, and ₱3,197 was collected for this purpose. More partnerships for the brokerage business were registered last year, due mainly to the gold boom which prevailed during August and September.

Registration of trade-marks and trade names.—During the year, 349 applications for trade-marks and trade names were examined. Out of this number 9 were rejected and the rest registered. The sum of ₱19,393 was collected for this purpose. The majority of foreign trade-marks registered in this Bureau come from the United States.

Filing of United States letters patents.—During the year, there were filed 55 certified copies of United States letters patents, which number surpassed that of the previous year.

Inspection work.—A total of 276 stores in Manila and neighboring provinces selling galvanized iron sheets, barbed wire, nails, paints, and materials were inspected, as provided in Acts Nos. 3595 and 3596. From October to December, a total of 1,503 tons or 30,060 sacks of commercial fertilizers of different brands were inspected, and samples taken for analysis in the Bureau of Science. All the fertilizers inspected were in Manila, as no inspection of fertilizer was made outside of the city due to lack of personnel who could be sent to other big ports. The inspection of mislabeled or adulterated goods, such as face powder, playing cards, toilet soaps, cosmetics, and pomades was also undertaken. A campaign against the so-called imitation racket was waged, but no appreciable progress in this direction was made due to lack of sufficient personnel to handle the work and lack of funds with which to buy samples of goods found to be mislabeled or adulterated.

Special investigations.—One of the most important accomplishments of the year was the investigation of several mining companies and stock or bond brokers for violations of the Corporation Law, the Blue Sky Law and the Fraudulent Advertising Act. The following mining companies were investigated: Big

Wedge Mining Co., Midas Mining Association, Demonstration Gold Mines, Ltd., Abra Mining Co., and Southern Cross Mining Co. Besides these companies, the Castmac, Inc. and the Goulette Estate were also investigated. Due to numerous complaints received by this Bureau from the public, about 17 brokers and brokerage firms were investigated for irregularities. These irregularities consisted in the failure of the brokers to deliver the stock sold or purchased or in the buying and selling of stock by the brokers on their own account.

Licensing and bonding of brokers.—Since May, 1933, a total of 300 brokers' certificates were issued. There was an unprecedented increase in the number of brokers licensed during August and September, due no doubt to the sudden interest of the public in the trading in the local stock market. A total of 504 brokers' licenses were issued during the year under review. Out of this number, 13 were suspended—1 for cause and 12 for failure to deliver bonds—36 voluntarily surrendered their certificates for cancellation on account of cessation of business, so that at the end of the year there were 455 licensed brokers actually engaged in business.

In view of the many irregularities committed by certain brokers, it was decided to require stock and bond brokers to file bonds as a measure to protect the interest of the investing public. The bond fixed was ₱10,000 for individuals and ₱20,000 for corporations or partnerships. Out of 66 licensed stock or bond brokers, 56 willingly filed their bonds, while only 10 failed to do so. The requirement to file a bond was extended to other classes of brokers without prescribing any uniform amount, as the bond is fixed in proportion to the average volume of their business for the last three preceding years.

Registration of aliases.—During the year a total of 291 aliases were registered under Act No. 3883.

Bulk sales documents.—During the year there were only three documents on the sale, assignment or transfer of wares, goods, or merchandise, as provided in Act No. 3952, examined and filed in this Bureau.

6. BUREAU OF SCIENCE

ROUTINE WORK

General statement.—The amount of routine done by the Bureau has been steadily and rapidly increasing for several years. This is due to a considerable extent to the increased appreciation of the work of the Bureau of Science by other Govern-

ment entities and by the public. The amount of routine has increased to such an extent that it occupies a large part of the time of the staff. This is emphasized by the fact that during 1933 the Bureau made 203,125 analyses, tests, and examinations, or about 677 for each working day. These figures do not include identification of plants, animals, and minerals. The amount of routine work done at the present not only exceeds that of any past period but is believed to be done in a more accurate and satisfactory manner than at any previous time since the establishment of the Bureau. The Bureau of Science does work and manufactures supplies, mostly free of cost, for practically all Insular Government entities. Brief mention is made below of some of the larger items for various entities.

Bureau of Health.—The Bureau of Science manufactures vaccines and serums in large quantities for the Bureau of Health, to which it sold 472,500 doses of vaccine against cholera, cholera-dysentery, typhoid, cholera and typhoid, dysentery, and smallpox, and furnished free of cost 14,596,913 units of vaccine against cholera, cholera-dysentery, typhoid, cholera and typhoid, and dysentery. In addition considerable amounts of other products were either sold or furnished free to the Bureau of Health.

The Bureau of Science serves as a laboratory for the Bureau of Health. During the year there were examined free for the Bureau of Health one sample of faeces; 4,560 samples of foods, alcohols, and beverages; 4,210 samples of water; and 64,282 rats for plague. In all, free examinations for the Bureau of Health were made of 73,053 specimens.

The enforcement of the Pure Food Law is in the hands of the Bureau of Health, and all analyses and examinations made in connection with the enforcement of this law are conducted by the Bureau of Science for the Bureau of Health.

Bureau of Public Welfare.—The Bureau of Public Welfare was supplied, free of charge, with 700 bottles of tikitiki extract for the cure of beriberi, having a sales value of ₧490.

Bureau of Quarantine Service.—The samples collected by the Bureau of Quarantine Service are sent to the Bureau of Science for analysis. More than 861 free examinations for that service were made during 1933, having a cash value of ₧3,454.

Board of Pharmaceutical Examiners and Inspectors.—The Bureau of Science serves as a laboratory for the Board of Pharmaceutical Examiners and Inspectors and makes all analyses for them in connection with the enforcement of the Drug Law.

Division of Purchase and Supply.—The Division of Purchase and Supply buys many articles on specifications, and these articles are tested by the Bureau of Science. During the year 1,600 such examinations were made, without charge, for the Division of Purchase and Supply.

In addition to making examinations for the Division of Purchase and Supply the Bureau of Science spent a great deal of time on the formulation of specifications to be used by the Division of Purchase and Supply in the purchase of materials. These specifications have already saved the Government a great deal of money.

Bureau of Public Works.—The Bureau of Science examines free of charge all samples of cement, concrete, and artesian well water for the insular projects of the Bureau of Public Works. During 1933 1,986 such free examinations were made. Also a large number of samples were submitted by the Bureau of Public Works for analysis or test for provincial or municipal projects.

COÖPERATION

U. S. Army Medical Department Research Board.—As in the past the United States Army Medical Department Research Board occupies quarters in the Bureau of Science. Coöperation with the Board has been a great help to the Bureau of Science, and the results of the Board's work are of value to the Bureau and to the Philippines as a whole. The Bureau of Science has placed its facilities at the disposal of the Board. The Board does no routine work; its activities are confined to research. An account of the work of the Board is given under "Research Work" in this report.

Rockefeller Foundation.—The Rockefeller Foundation continued working with the Bureau during the year. It worked on a wide variety of problems concerning malaria and obtained valuable results on larvicides, avian malaria, malarial surveys, and along other lines. An account of the work done in coöperation with the Rockefeller Foundation is given under the heading "Malaria Investigations" in the chapter "Research Work."

Manila Railroad Company.—As during the past eight years, the work in coöperation with the Manila Railroad Company was continued. The investigation work is primarily along lines that are of interest to the railroad and also of great value to the Government. In addition to these activities an employee of

the Manila Railroad Company supervises the control analysis of coal, cement, paints, oils, metals and alloys, petroleum products, and other materials.

Philippine Sugar Association.—A technical man of the Philippine Sugar Association has been stationed in the Bureau of Science and has coöperated with the Bureau in the investigation of soil problems.

Metropolitan Water District.—As in past years the Metropolitan Water District has supplied a chemist especially for the chemical examination of the water of Manila. This chemist makes several determinations daily of the chlorine content of the city water, while a bacteriologist of the Bureau of Science examines the water several times each day for bacterial content. The results of these examinations are highly satisfactory and indicate that the city water as it comes from the tap is safe for drinking and other domestic purposes.

PUBLIC SERVICE IN GENERAL

The work of the Bureau of Science for the public covers a wide field and directly or indirectly touches almost every phase of human activity in the Philippines. Most of the activities of the Bureau are of great importance to the public but are carried on so unobtrusively that the public hears or sees nothing of them.

The health of the public is protected against epidemic diseases by vaccines manufactured by the Bureau of Science. The most outstanding accomplishment along this line was the manufacture of cholera-dysentery vaccine, of which a total of 6,310,000 doses was disposed of, mostly to the Bureau of Health. In addition, large quantities of other vaccines were manufactured and disposed of. In all, the Bureau of Science disposed of 15,109,290 doses of vaccines. Among the most important of these were vaccines against smallpox, cholera, typhoid, and dysentery.

Smallpox, which used to be a tremendous scourge and caused terrible epidemics, is now little feared owing to the use of vaccine. The efficiency of this vaccine is due to a considerable extent to improvements introduced in its manufacture by the Bureau of Science. The last cholera epidemic was ended with the use of Bureau of Science vaccine against cholera. So long as vaccination is continued there should be no further epidemics. Vaccine has also been a great agency in the control of typhoid.

More recently the Bureau of Science perfected an anti-dysenteric vaccine suitable for local conditions and causing no painful reaction.

The Bureau of Science helps the health conditions in the Islands in many other ways. Important among these is the examination of foods submitted by various agencies, including the Bureau of Health and the Bureau of Customs. Such substances are examined to see that they meet the requirements of the Pure Food and Drug Act. Particularly important is the examination of imported canned goods, such as salmon and sardines. Some of the local products examined include ice cream, coconut and other vegetable oils, meats, lard, milk, soft drinks, alcoholic beverages, bread, confectionery, fruits, vegetables, fish, sugar, molasses, soaps, cheese, dyes, flour, and cereals. During the year over 9,353 examinations were made on food substances and soft drinks. Bacteriologic examinations are also made on the food handlers in Manila. Waters all over the Philippines are examined, both bacteriologically and chemically, and no waterworks project is started until the Bureau of Science certified that the water is suitable for human consumption. More than 8,555 examinations of water were made in 1933.

The Bureau of Science also assists the Quarantine Service in keeping out epidemic diseases. In 1933, 65,154 rats were examined for plague as a protection against the introduction of this disease in the Islands.

Better known is the antirabic treatment against rabies. Each treatment consists of twenty-five injections, which are furnished free. During the year, 2,676 such treatments were given. The antirabic treatment is also used by city veterinarians in Manila to vaccinate dogs.

The Bureau of Science assists the Bureau of Health, the Quarantine Service, and other government entities as well as private doctors, in making diagnoses by examining specimens, such as faeces, blood, sputum, and urine. In 1933, 21,959 such examinations were made. For the protection of the public the Pure Food and Drug Act of the Islands requires that the containers of drugs and biologic products be properly labeled and that the labels state accurately the constituents of the drug. Under this law drugs are collected by the Board of Medical and Pharmaceutical Examiners and Inspectors and analyzed by the Bureau of Science; if found to be mislabeled, they cannot be sold.

The strength of cement and other structural materials that go into the construction of buildings and the strength of the resulting concrete are very important from the standpoint of public safety. The Bureau of Science is required to test all cement used in government structures and in buildings in the City of Manila, and the resulting concrete in these structures. In 1933, 1,875 such tests were made.

The Bureau of Internal Revenue is in charge of the supervision of weights and measures used to weigh and measure articles sold in the Philippine Islands, but the Bureau of Science carries on the examination and certification of standard weights and measures.

The Bureau works for the farmers by examining soils and fertilizers. All fertilizers sold are required to be registered in the Bureau of Science, and the Bureau of Commerce inspects fertilizers to see that the farmer gets the composition guaranteed by the manufacturer.

The Bureau also aids the farmer by investigating the cause, prevention, and remedies of plant diseases and by giving information and advice on these subjects.

The Bureau of Science is open to the public for consultations on all matters pertaining to science, and it makes examinations for the public of almost all conceivable kinds of articles. These examinations include medical specimens, cotton goods, paper, leather goods, galvanized iron, mineral oils, food products, paints, and practically anything that requires testing.

Consultations and advice are given free to manufacturers of and merchants dealing in soaps, oils, paints, dairy products, soft drinks, ice, artesian water, etc.

The researches conducted by the Bureau of Science have aided the development of industries in the Philippines and the promotion of sanitation and the development of medicine.

Researches conducted by the Bureau of Science have resulted in the establishment of numerous industries and the improvement of a great many more, while the possibilities of still other industries have been pointed out. These include glass, paper, vitrified brick, ceramics, medicinal remedies, paint oils including lumbang, and numerous others.

Original work done by the Bureau of Science along medical lines has been very important. As enumeration of all of it would require much space, but one example may be mentioned here. For many years beriberi was a cause of much infant mortality, until scientists working in the Bureau brought for-

ward tikitiki extract as a remedy. Tikitiki extract is now made by a number of firms and also by the Bureau of Science. The Bureau's product is distributed free by the Bureau of Public Welfare through its puericulture centers. During 1933 the Bureau of Science furnished the Bureau of Public Welfare, without cost, 700 bottles of tikitiki extract.

7. WEATHER BUREAU

General statement.—The main activity of the Weather Bureau was the preparation of a weather map and a weather forecast twice daily, the preparation and distribution of typhoon warnings to shipping and to the provinces, the collection, coordination, analysis, and printing of the monthly bulletins and annual reports for the study of the tracts of the typhoons and the climatology of the Islands. The activities of the Magnetic and Seismic Division were directed towards the recording, interpretation, and issuance of reports on seismic disturbances, the observation of magnetic elements, the reduction of these observations, and the publication of results. The Astronomical Division was engaged in the determination, maintenance, and transmission of the correct time by radio and telegraph to shipping and to all telegraph stations of the Islands, in the continuous recording of the potential gradient of atmospheric electricity and in the observation of long period variable stars.

METEOROLOGY

Typhoons and depressions.—There were six depressions and nineteen typhoons near or over the Philippines during the year 1933. The depressions were distributed by months as follows: one each in February, June, and July, and three in November. The typhoons were distributed as follows: one in April, four in July, three in August, four in September, five in October, and two in November. The first six months of the year were relatively free from disturbances; while during January, March, May, and December the Philippines were entirely free from depressions and typhoons. Two depressions and seven typhoons had their centers over the Islands, but only two typhoons were of serious intensity.

The first of these rapidly traversed the Islands on October 29, but fortunately its force was only moderate and besides its center touched land at only a few places; i. e., the northeastern tip of Mindanao below Surigao, the southernmost part of Negros near Dumaguete, and Palawan close to Iwahig. The Iwa-

hig Penal Colony suffered the most, especially from floods. The second typhoon developed on November 2 and 3 and followed closely after the first, both in time and space, taking an almost parallel path just north of the first. The center passed within twenty to thirty miles of six important towns—Surigao, Masasin, Ormoc, Cebu, Iloilo, and Culion—but the loss both in lives and in property was rather small, first because ample warnings were issued, and second because nowhere in the Islands did the typhoon attain great intensity.

Rainfall.—Because of the small and moderate intensity of the typhoons from April to November, the average rainfall was below normal over northwestern and Central Luzon but above normal along the eastern coast. A timely and abundant, yet not excessive rainfall, was favorable to the development of all main crops. If the price of the products has been low, at least the production of crops has not been hindered by adverse natural conditions.

Typhoon warnings.—This year 69 typhoon warnings, as against 136 in 1932, were sent to the foreign observatories of the Far East: Tokyo, Zikawei (Shanghai), Taihoku (Formosa), Phulien (Indochina), and Hongkong, as well as to the American Consul at Hongkong. Hongkong observatory continued sending its typhoon warnings. Occasional warnings were received also from Zikawei Observatory. Two or three times a day, or even oftener if necessary, typhoon warnings were wired to the Naval Radio Station at Los Baños and to the Radio Corporation of the Philippines to be broadcast to all steamers equipped with wireless apparatus. Besides these warnings, two complete daily weather reports based on the 6 a. m. and 2 p. m. weather maps were transmitted during the year to the two stations just mentioned and to Fort Santiago to be broadcast by radio. The morning weather reports were wired also to the Superintendent of the Telegraph Division of the Bureau of Posts and to the Manila Railroad Company for transmission to all the stations of their systems. Frequent warnings regardless the position and direction of typhoons were sent regularly as heretofore to the Bureau's first-, second-, and third-class stations, to the Navy stations at Cavite and Olongapo, to the Quarantine station of Mariveles, to the Artillery Engineer of Corregidor, to the Mindoro Sugar Company, San Jose, Mindoro, to the Surveyor of Customs, Manila, to the Superintendent of the Telegraph Division of the Bureau of

Posts, to Fort Santiago, and to the Manila Railroad Company. Regular typhoon warnings have also been sent directly, but only in cases of dangerous typhoons, as in previous years, to the governors of the provinces in the capitals of which there is as yet no forecasting meteorological station.

At the request of the owners of radio sets, the broadcasting station KZRM broadcast on the earliest possible schedule the position and direction of typhoons, as announced by the Weather Bureau. This system of bringing typhoon warnings directly to the homes of the people has undoubtedly assisted in minimizing the dangers consequent upon the passage of a typhoon.

Weather maps.—Copies of the daily weather maps were regularly distributed by messenger at about 2 p. m. to the Ayuntamiento, City Hall, Bureau of Customs, Asociación de Navieros, Philippine National Bank, Bureau of Plant Industry, Manila Terminal, Construction Division, Transportation Division, and the Air Service of the Philippine Department, and mailed every day to the Metropolitan Water District, to the College of Agriculture at Los Baños, and to the Commandant of the Cavite Navy Yard. The same weather maps were also mailed at the end of every month to the U. S. Weather Bureau, Washington, D. C. Special weather reports have also been systematically given to the Iloilo Negros Air Express, as well as to the Philippine Aërial Taxi Company, when desired.

Weather stations.—At the end of the year there were 55 official stations and 133 volunteer or coöperative stations, as against 175 and 104, respectively, at the end of 1932. The two stations of Ambulong and Antipolo, primarily seismic and magnetic, respectively, continued reporting meteorological observations also; hence they are included in the above total number of official stations. These stations are subdivided as heretofore, into two big groups, the meteorological or forecast stations, and the climatological or rain stations. The meteorological or forecast stations at the end of the year, were nine first-class stations, including the branch observatory at Mirador, Baguio; 10 second-class stations including the seismic station at Ambulong, and 29 third-class stations, including Yap. The climatological or rain stations were seven, including Antipolo. All these stations make rain observations; hence there were at the end of 1933, 188 stations reporting rain observations for climatological purposes.

SEISMOLOGY

World earthquakes.—Seismic activity during the year 1933 may be said to have been normal. There were three severe earthquakes which attracted world-wide attention. The first was off the coast of Japan on March 2; the second near Long Beach, California, on March 11; and the third in the western part of Szechuan Province, China, on August 25.

P. I. earthquakes.—The strongest earthquake during the year in the Philippines did not approach any of the above in intensity. It occurred on February 19 at 12.35 p. m. and was located near the center of the Province of Camarines Norte. Slight damage was caused at San Vicente and Indan.

The number of earthquakes felt in Manila was 10, which is somewhat above the normal quota. One of these, that of June 6, was felt rather strongly along the southern border of Laguna de Bay. The brick work in the sugar central at Nasugbu was damaged.

The total number of earthquakes registered in Manila during the year was 835. About 130 were felt at various places throughout the Islands.

Pacific Science Congress.—The Fifth Pacific Science Congress held a session in Victoria, and Vancouver, Canada, from June 1 to 15. The chief seismologist of the Bureau attended the Congress as official representative of the Philippine Islands. In addition to a formal paper presented at the Congress, opportunity was found to give a historical account of the seismological work of the Manila Observatory since its foundation in 1863.

OTHER ACTIVITIES

Time service.—The Bureau continued the daily transmission of first-class time signals to the telegraph office of the Bureau of Posts, to the Paco Radio Station of the Manila Railroad Company, and to the United States Naval Station at Cavite. The Bureau discontinued the noon hour signal given by means of the time ball on top of the Observatory tower. This method of giving correct time is now superseded by radio broadcast. The time service has satisfied the requirements for first-class time signals which must be correct to within one-tenth second of the true time.

Variable stars observations.—The regular program of observations of long period variable stars was resumed. During

the year 428 observations were made on 38 observing nights. From April to the end of the year weather conditions prevented the routine observation necessary for this work. However, since the Manila Observatory has been working in unison with several other observatories throughout the world, the observations obtained here are valuable.

8. FISH AND GAME ADMINISTRATION

Licenses and regulations.—Deep-sea and off-shore fishing regulations were promulgated to take effect April 1, 1933.

Owing to the depression many fishpond permittees and applicants failed to pay the annual rentals or bonds or both. Consequently many ordinary fishpond permits and four lease agreements were not extended or renewed. At the end of the year 240 ordinary fishpond permits and 14 lease agreements were in force, covering approximately 2,268 hectares and 281 hectares, respectively. The annual rentals, many with surcharges, collected during the year amounted to ₱10,134.81.

There were 90 commercial fishing boat license applications received but only 88 licenses were issued. The total tonnage of fishing boats licensed was 1,987 and the annual fees amounted to ₱1,987. Commercial fishermen's licenses issued were 877 and the corresponding annual fees collected amounted to ₱211.20.

A total of 3,873 ordinary hunting licenses were issued, 24 of them renewed.

It is believed that considerably more than this number have paid for the hunting license fee in 1933, but many payments may not have been reported or the payers may not have applied for licenses. It seems to have been the practice of many licensees in previous years to pay the annual hunting license fees and consider the miscellaneous tax receipts issued to them by municipal treasurers as their authorization to hunt.

There were 26 special licenses for scientific purposes issued in 1932 which expired in the second and third quarters of 1933, and 43 issued in 1933, ten of which will expire in the second quarter of 1934.

Beginning September 16, 1933, periodic patrol has been kept by game wardens from the Manila Office of the Fish and Game Administration in the provinces near Manila—Rizal, Laguna, Cavite, Bataan, Bulacan, Pampanga, and Nueva Ecija. Several violations were discovered and appropriate action taken.

Manila Aquarium.—Many important repairs and improvements were made in the Manila Aquarium. In January 672 fishes were collected at Calapan, Mindoro, and in November another collection of 439 from Lubang and Calapan was added. The receipts in 1933 amounted to ₱2,978.80 from paid admissions of 13,671 at ₱0.20, and 2,446 at ₱0.10, and ₱49.55 from post cards and booklets sold. Admissions by passes, issued to school children mostly, reached 9,232.

Experimental Fish Farm.—The Experimental Fish Farm at Hinigaran, Occidental Negros, has been placed under one technical man since May. Important improvements have been introduced; a second experimental pond for growing algæ and two beds for the cultivation of oysters have been completed. The main pond was divided diagonally into two by the construction of a dike of 155 meters. For bañgos and other fishery products harvested from the fishpond and sold the amount of ₱741.92 was received.

Accessions.—About 6,500 living and dead specimens have been added to our Aquarium and working collections, 4,742 of which are fishes and 569 are birds.

Revenue received.—A total of ₱27,784.50 has been collected as itemized below:

(a) Fishpond, annual rentals	₱10,334.81
(b) Commercial fishing boats, annual fees.....	5,870.22
(c) Commercial fishermen's license fees.....	211.20
(d) Ordinary hunting licenses, annual fees.....	7,338.00
(e) Shell diver's license fees.....	10.00
(f) Admission tickets, Manila Aquarium.....	3,028.35
(g) Aquatic products, Hinigaran Fish Farm.....	741.92
(h) Fishes and other aquatic products and plants.....	250.00
Total	₱27,784.50

9. DIVISION OF MINERAL RESOURCES

Field work.—During the year geological investigations and field work were carried on in all provinces and districts where location of claims and prospecting and development were more or less active.

Geological investigations of the following mining properties were paid for by private parties: Virac Mining Company, Solomon Group, Pine Ridge, Kato and Pamalahan Group, Big Basig, Araneta Claims, and Bonanza, all in the Baguio Mineral District.

Assay Laboratory.—The number of samples received for assay was 3,173, of which 3,129 were ore assays and 44 bullion assays. Samples consisting of gold chips, gold pens, gold waste, and platinum waste were submitted for smelting and refining. The following table shows the amount of work performed by the Assay Laboratory during 1933:

	Number of samples	
Assay	3,173	P7,241.96
Smelting and refining of gold and other precious metals	3	245.49
Total	3,176	P7,487.45

Coöperation.—The usual help was extended the Bureau of Public Works in locating suitable sites for artesian wells. The total number of well samples examined for the Bureau of Public Works was 362 representing 43 wells.

In connection with the Blue Sky Law the Insular Treasurer requested opinion as to the reasonableness of the evaluation given to mining properties acquired by mining and exploration companies or paid to claim holders. This work is probably the most important single activity of the Division of Mineral Resources.

Mineral lands.—During the year 617 location surveys were ordered. Application for 23 lode patent surveys were received, 14 of which were issued to surveyors of the Division of Mineral Resources. Three lode mineral patents were issued while two were pending at the end of the year.

A total of 42,737 mining claims representing an approximate area of 382,499 hectares were located during 1933. Of these 40,510 are lode claims while 2,227 are placer claims. Most of these claims were located in the Mountain Province, Abra, Pangasinan, Nueva Ecija, Ilocos Sur, Camarines Sur, Nueva Vizcaya, Zambales, La Union, Bulacan, Rizal, Ilocos Norte, Camarines Norte, Oriental Misamis, Pampanga, and Mindoro.

There were two geological exploration lease applications for petroleum, but only one was approved.

10. FIBER INSPECTION SERVICE

Inspection districts.—During the year the farmer fiber inspection stations were reorganized into four fiber inspection districts, viz: Manila, Cebu, Davao, and Legaspi, with Tabaco as

a subdistrict of Legaspi. These districts, with the exception of Manila, are under the charge of district fiber inspectors. During the latter part of the year the travelling fiber inspector was sent to Davao to take charge of that district as it was deemed necessary that a ranking officer be in charge of that district on account of its increasing importance as a fiber producing district.

Grading-baling establishments.—At the beginning of the year there were 61 grading-baling establishments. During the year, 15 grading-baling establishments did not renew their permits, but grading permits were issued to two new grading-baling establishments, so that at the close of the year there were a total of 48 grading-baling establishments throughout the Islands.

Work accomplished.—There were inspected and approved during 1933, 1,227,987 bales of abacá fiber. The total number of bales of all kinds of Philippine fibers with established grades which were inspected and approved during the year was 1,337,885. The rejections during the same period amounted to 7,396 bales, or .553 per cent of the total number of bales inspected. The percentage of rejection was very small in comparison with previous years due in part to the consolidation of all the U. K. grades under one standard grade "AB," and to better care in the sorting of the so-called U. S. grades by the grading-baling establishments.

Fiber situation.—The fiber situation during the year just closed was no better, if not actually worse, as regards the value of the fiber produced, than during 1932. The production of abacá during 1933 was normal, being 1,227,987 bales, or two-fifths more than the total production for the year 1932, which was only 872,954 bales. It is noted also that while fiber production in the Bicol Provinces and in the Visayan Islands is on the decrease, that of Davao district is increasing, due, no doubt, to better care being given to the plantations by the planters in Davao.

11. DIVISION OF NAVIGATION

Operation of vessels.—During the year the following vessels were in operation: steamer *J. Bustamante*, cutter *Banahao*, cutter *Canlaon*, launch *Ethel* and Scow No. 3.

The launch *Jolo* which was tied up at Engineer Island since the previous year was placed out of commission on April 6, 1933, and sold at public auction by the Insular Auditor.

During the year the vessels were engaged in the following work: Inspection and delivering of supplies to lighthouses; transportation of construction parties, materials, lightkeepers and their families, and the care and preservation of buoys, beacons and other aids to navigation; transportation of high government officials; laying and repairing government marine telegraph cables; collection and segregation of lepers, and transportation of relatives of lepers visiting at Culion; furnishing steamship transportation connection between places where sufficient and adequate steamship service was not provided by private firms; trade promotion work; emergency trip, and maintenance of bay and river transportation in Manila.

There were 18 trips made for lighthouse purposes including a trip which was made in combination with cable work. During the lighthouse trips the cutters performed various other services.

Lighthouse service.—During the past year two acetylene gas-lighted buoys and two fixed port red lights were established as follows:

Molocaboc Pass Gas Buoy, southwest of Molocaboc Island, Negros.—An automatic acetylene gaslighted buoy, showing one white flash every 3 seconds, was installed on northwest edge of a 9-fathom patch, southwest off Molocaboc Island, on May 6, 1933.

Siete Pecados Gas Buoy, eastern entrance to Iloilo Strait, Iloilo.—An automatic acetylene gas-lighted buoy, showing one white flash every 5 seconds, was installed on southwest edge of a $\frac{1}{2}$ -fathom shoal, off Siete Pecados Islets, replacing second-class red nun buoy No. 8, on May 1, 1933.

Allen, northwest of Samar.—A fixed red light, small lens lantern, displayed 37 feet above mean high water and 32 feet above ground from a 30-foot concrete tower was established on March 28, 1933, on the beach of the town of Allen, a little to the north of entrance to Sabag River.

Calbiga, westcoast of Samar.—A fixed red light, small lens lantern, displayed 37 feet above mean high water and 32 feet above ground from a 30-foot concrete tower was established on May 13, 1933, on the northern part of Uacuae Island, at the mouth of Calbiga River.

During the year under review the following aids to navigation were permanently discontinued:

Port Banga Light, east coast of Zamboanga, Mindanao.—The fixed red light, small lens lantern, on eastern extremity of Bangaan Islands, was permanently discontinued.

Siete Pecados Nun Buoy, eastern entrance to Iloilo Strait, Iloilo.—The second-class red nun buoy No. 8, southwest edge of $\frac{1}{2}$ fathom shoal, off Siete Pecados Islets, was discontinued permanently, having been replaced by a gas-lighted buoy.

The improvement of the following aids to navigation was undertaken during the year:

Manila Bay Breakwater Lights, Manila Bay.—The automatic acetylene flashing red light on the Manila Breakwater, south end of west breakwater marking north side of entrance to Manila Harbor, was transferred to a newly constructed cylindrical steel tower with concrete base, 39-feet above mean high water and 34 feet above ground, with distance of visibility of 7 miles; and the automatic acetylene flashing green light on the Additional Breakwater (north), north end of the same, was transferred to a newly constructed cylindrical steel tower with concrete base, 33 feet above ground, with a distance of visibility of 4 miles.

Construction.—New lighthouses were constructed during the year as follows:

(a) Supervised by the Division of Navigation—

1. **Pearl Bank, Sulu Sea.**—One 57-foot cylindrical steel tower with accessory structures to display a light of 25 miles' visibility, replacing the unattended automatic acetylene light, built by the Philippine Steelhouse, Inc., contractors.

2. **Sibago Island, Basilan Strait, Mindanao.**—One 62-foot steel-framed tower with accessory structures to display a light of 20 miles' visibility, replacing the unattended automatic acetylene light, built by Marikina Valley Construction, contractors.

3. **Cabadbaran, Agusan.**—One standard 30-foot steel beacon at southern entrance point to exhibit a fixed port green light.

4. **Cabusao, Camarines Sur.**—One standard 30-foot steel-framed tower to exhibit a fixed red light.

(b) Supervised by the Bureau of Public Works:

ALREADY COMPLETED

1. **Cabilison Island, Samar.**—One 62-foot structural frame steel tower with cylindrical stairways for a sixth order light.

IN PROCESS OF CONSTRUCTION

2. **Tres Reyes Group, Marinduque.**—One 62-foot structural frame steel tower with cylindrical stairways for a fourth order light.

3. **Calavite Point, Mindoro.**—One 62-foot structural frame steel tower with cylindrical stairways for a sixth order light.

4. **Dumali Point, Mindoro.**—One 62-foot structural frame steel tower with cylindrical stairways for a fourth order light.

5. **Apunant Point, Romblon.**—One 62-foot structural frame steel tower with cylindrical stairways for a sixth order light.

These newly established aids to navigation will be put in operation in 1934, as soon as the apparatus ordered abroad for these lights are received and properly re-assembled and adjusted for installation.

12. DIVISION OF STATISTICS

General statement.—The Division of Statistics has undertaken the collection, compilation, and systematization of statistics relative to (a) agriculture and livestock; (b) commerce and industry; (c) transportation and communications; (d) finance; (e) population, education, and health; (f) forestry, mining, and fishing; and (g) miscellaneous data. As a result of these activities, the Division was able to publish a statistical handbook of the Philippine Islands containing 288 pages and covering such subjects as population, lands, agriculture, livestock, forestry, manufacturing industries, mining, labor, foreign and domestic trade, transportation and communication, finance, and other miscellaneous statistics. The division also prepared a pamphlet of facts and figures about the Philippines, containing 87 items of general information about the Islands, such as area, population, daily wage rate, death rate, rainfall, per capita wealth, roads, railroads, motor registration, foreign and domestic shipping, telephone and telegraph, foreign trade, agricultural production, livestock production, mineral output, banking and insurance, building and loan associations, public utilities, monetary circulation, bonded indebtedness, and newspaper circulation. To satisfy public demand for statistical data on crops and livestock, bulletins were made. The bulletins on crops contain statistical data on rice, coconuts, abacá, corn, sugar cane, fruits and nuts, root crops, tobacco, maguey, vegetables, citrus, cacao, coffee, and miscellaneous crops. The livestock bulletins contain statistical data on carabaos, cattle, horses, hogs, sheep, and goats. An economic survey conducted by the Division resulted in the preparation of provincial monographs presenting cross-sections of the economic and social conditions of each province. The Division likewise has made exchanges of statistical literature with other countries.

Summary of accomplishments.—The following table is a summary of the accomplishments of the Division during the year.

Nature of activity	Number
Number of inquiries	1,324
Projects accomplished	163
Correspondence handled	17,213
Reports compiled:	
Crop	176,454
Livestock	28,779

Nature of activity	Number
Publications distributed:	
Statistical Handbook of the Philippines, 1932.....	3,042
Facts and Figures about the Philippines, 1932.....	1,500
Crop bulletins	12,750
Livestock bulletins	1,500
Provincial monograms	500
Statistical bulletins (back numbers).....	1,469
Publications received	204
Special tables	179
Charts, graphs, and pictograms.....	87
Other activities:	
Number of callers attended to	1,020
Unclassified	11

13. SCIENTIFIC LIBRARY DIVISION

General statement.—The main library contains 149,360 bound and unbound volumes, periodicals and pamphlets, and receives currently 2,519 periodicals. Its catalog contains about 216,000 cards. The books added during the year have been important and valuable and have added materially to the resources of the library. The inquiries received which required some research were more than those received in previous years and showed the usual variety of subjects. There were 17 bibliographies compiled consisting of 198 typewritten pages; 34 requests for references were received from foreign countries and 16 packages of publications loaned out; 528 notification cards were sent out calling the attention of researchers to articles of interest to them. There were 237 packages of publications loaned to provincial readers, most of which went to the Los Baños college. There were 35,765 publications used in the library during the year as against 30,625 used in 1932; 13,404 publications were used outside of the library.

Outstanding work.—Among the most outstanding accomplishments of the Division during the year are the completion of the additional library stocks relieving partly the much crowded condition in the main library; the classification and cataloguing of more than half of the various collections fused with the main library; the issuance of a bibliography of the nine major crops of the Philippines: rice, sugar cane, abacá, coconut, tobacco, corn, coffee, cacao, and maguey; and the completion of an alphabetical and classified list of current serials received in the library.

14. DIVISION OF PUBLICATIONS

General statement.—Immediately upon the organization of the Division it undertook the editing of the Philippine Journal of Science and the Philippine Journal of Agriculture, as well as of bulletins and other publications. The Philippine Journal of Commerce and the Animal Industry Gazette are still edited in the Bureau of Commerce and the Bureau of Animal Industry, respectively, on account of lack of personnel in the Division.

To be of real benefit to the people of the Philippine Islands the results of the activities carried on by various government bureaus and offices must be made available in printed form. This the Division of Publications attempts to do in publishing the Philippine Journal of Science, the Philippine Journal of Agriculture, and monographs and popular bulletins of interest to the general public.

Philippine Journal of Science.—The Philippine Journal of Science appears monthly under the auspices of the Department of Agriculture and Commerce. It is devoted to the publication of the data of scientific researches on subjects of peculiar importance to the Philippine Islands. Most of the manuscripts submitted for publication in the Journal are based on studies conducted at the Bureau of Science, although many papers come from the Philippines at large as well as from the United States, Germany, Japan, and elsewhere.

Philippine Journal of Agriculture.—This Journal is devoted to agricultural problems of the Tropics with special reference to agricultural conditions in the Philippine Islands. It contains the results of experiments and investigations made in the field of horticulture, agronomy, animal husbandry, and like subjects. It is a quarterly publication.

Philippine Journal of Commerce, Bureau of Animal Industry Gazette, Makiling Echo.—These are the publications of the Bureau of Commerce, the Bureau of Animal Industry, and the Bureau of Forestry, respectively. The Philippine Journal of Commerce appears monthly and is devoted to the promotion of Philippine industry and commerce and to problems of domestic and foreign trade. The Gazette also is a monthly publication, devoted to articles and editorials on the practical aspects of animal husbandry and the utilization of animal products; it is mimeographed and bound in the Division of Publications. The Makiling Echo appears quarterly and contains

articles on the care, cultivation, and development of the forests of the Philippine Islands, and on the intelligent use of forest products.

The preparation of these publications was ordered to be shifted to the Division of Publications; so far, however, the reorganization of the publication work under the Department is still under way, and no arrangements have been made as yet for their publication in the division. However, as soon as circumstances permit, they will be taken over by the division.

15. VETERINARY EXAMINING BOARD

The Veterinary Examining Board consists of one chairman and two members, all appointed by the Secretary of Agriculture and Commerce. They hold office for three years. During the year 1933, Dr. Segundo Alano was the chairman, and Dr. Teodoro Topacio and Dr. Marcos Tubangui were the members. The Board examined 16 candidates, only 12 of whom passed. As the members of the Board are regular government employees, they were not given additional remuneration. The Board had an income of ₱400 derived from examination fees.

16. BOARD OF EXAMINERS FOR SURVEYORS

Like those of the Veterinary Examining Board, the members of the Board of Examiners for Surveyors are appointed by the Secretary of Agriculture and Commerce. The membership of the Board was reduced from five in 1932 to three in 1933. The following were the members of the Board from January 1, 1933, to April 6, 1933; Mr. Vicente Mills, chairman; Mr. Juan Coronado, member; and Mr. Raymundo Kagahastian, member. From April 7 to the end of the year the membership was as follows: Mr. Juan Coronado, chairman; Mr. Raymundo Kagahastian, member; and Mr. Teodosio Trinidad, acting member. The Board issued 25 certificates classified as follows: 21 for private land surveyors, 1 for cadastral land surveyor, and 3 for mineral land surveyors. The Board held examinations for private land surveyors and mineral land surveyors. Of 19 applicants for the private land surveyor examination, 14 obtained passing grades. The only applicant for the mineral land surveyor examination also obtained a passing grade. During the year 19 administrative charges were filed with the Board. It heard and decided 3 cases and acted on 21 cases.

17. OFFICE OF THE SECRETARY

The Office of the Secretary performed the usual general supervision over bureaus, divisions, and offices under the Department as well as routine service. During the year regular weekly meetings of all chiefs of special divisions and chief clerks of bureaus, presided over by the Under Secretary, were held. At these meetings, matters of general concern were discussed. The Department created an Efficiency and Economy Committee as well as Efficiency and Economy Committees for the bureaus, divisions, and offices under it. The Department Efficiency and Economy Committee was composed of Dr. Victor Buencamino, Director of Animal Industry, chairman, Mr. Arthur F. Fischer, Director of Forestry, and Mr. Lorenzo Celeste, Chief, Division of Accounts and Property, members, and Mr. Victor Pagulayan, chief clerk of the Bureau of Animal Industry, recorder. The Committee held 18 meetings up to the end of the year and passed 63 recommendations to the General Efficiency and Economy Committee appointed by the Governor-General. Twenty-three of these recommendations were approved.

On November 4, 1933, Secretary V. Singson Encarnacion left for the United States with the Independence Mission headed by Senate President Manuel L. Quezon and left the charge of the Department to the undersigned who was designated by the Governor-General as Acting Secretary.

II. FINANCIAL STATEMENT

General statement.—The data and tables appearing in this statement were prepared by the Division of Accounts and Property, a special division created by virtue of the reorganization in the Department. The Division supervises and looks after the proper accounting, disbursement, and expenditure of the appropriations and allotments for all the bureaus, offices, and special divisions under the Department of Agriculture and Commerce. Incidentally, it also takes charge of all the property and equipment in the bureaus and offices of the Department.

Appropriations and expenditures.—The appropriations available for the Department of Agriculture and Commerce for 1933 were as follows:

For salaries and wages.....	₱3,373,638.00
For sundry expenses	845,804.00
For furniture and equipment.....	32,672.00
Special appropriations	235,032.00
Less: Forced savings apportioned by the Secretary.....	(213,683.00)
Total (page 206, Act 4032).....	₱4,273,463.00

Expenditures classified by bureaus and offices.—The following consolidated statement shows the total allotment, the total expenditures, and the total unexpended balance reverted to unappropriated surplus by each bureau and office:

Consolidated statement of appropriations and expenditures by Bureaus and Offices

[Fiscal year 1933]

Bureau or office	Total appropriations and allotments	Total expenditures and other charges	Unexpended balance reverted to unappropriated surplus
Office of the Secretary.....	₱91,535.40	₱86,435.89	₱5,099.51
Fish and Game Administration.....	59,095.00	57,041.27	2,053.73
Mineral Resources.....	38,073.50	37,822.24	251.26
Home Economics.....	27,133.00	26,799.49	333.51
Navigation.....	459,226.08	456,732.98	2,493.10
Accounts and Property.....	151,426.80	150,645.98	780.82
Statistics.....	30,446.00	30,274.51	171.49
Scientific Library.....	51,587.18	51,019.57	567.61
Publications.....	46,645.35	46,013.00	632.35
Total for Office of the Secretary and Special Divisions.....	955,168.31	942,784.93	12,383.38
Plant Industry.....	445,069.27	442,840.79	2,228.48
Animal Industry.....	404,344.25	404,344.25	.....
Forestry.....	630,912.37	628,616.99	2,295.38
Lands.....	1,074,466.72	1,015,622.61	58,844.11
Science.....	369,025.26	369,025.26	.....
Commerce.....	206,499.82	206,437.06	62.76
Weather.....	187,175.00	180,026.53	7,148.47
Total for the entire Department.....	₱4,272,661.00	₱4,189,698.42	₱82,962.58

Expenditures classified by types of activities.—The following statement of expenditures is classified into promotional or extension activities, research work, control of pests and diseases, and general service. In view of the difficulty of classifying appropriations for the different activities, the figures shown hereon are only approximate.

Expenditures classified by types of activities

Bureau or office	Promotional activities	Research work	Control of pest and diseases	General service	Construction and maintenance of roads and bridges system, including survey and reclassification of Friar lands	Total
Office of the Secretary including Special Divisions.....	P226,689.64	P223,662.11	P278.50	P915,706.94		P1,142,675.08
Bureau of Plant Industry.....	188,776.90	371,941.14		145,610.59		529,390.74
Bureau of Animal Industry.....	52,903.40	227,166.55		55,903.12		418,809.08
Bureau of Forestry.....	8,621.21	115,477.82		504,517.96		628,616.99
Bureau of Lands.....				1,344,556.64	P70,925.27	1,415,481.91
Bureau of Science.....		218,347.37		150,677.89		369,025.26
Bureau of Commerce.....	184,805.99			98,337.16		283,143.15
Weather Bureau.....				180,026.53		180,026.53
Total.....	641,797.14	610,323.31	599,386.19	3,395,326.83	70,925.27	5,317,758.74
Total expended and obligated.....						4,189,698.42
Difference.....						1,128,060.32

This difference is due to expenses paid from special appropriations itemized as follows:

FISH AND GAME ADMINISTRATION

Funds for reorganizing and strengthening the Division of Fisheries.....

P10,704.17

DIVISION OF NAVIGATION

Construction and repair of light houses and buoys.....

179,071.98

OFFICE OF THE SECRETARY

Contribution to the Philippine Tourist Association.....

10,114.00

BUREAU OF PLANT INDUSTRY

Protection of Agricultural Industries, Act 3027.....

5,977.27

Fiber Education Campaign, Act 3263.....

34,035.10

Fighting and Extermination of Locusts, Act 3924.....

167,858.86

Los Baños Economic Garden, Act 3910.....

4,310.60

Purchase, planting, preparation, and distribution of seeds in the regions affected by typhoon, Act 3527.....

11,244.14

Additional Locust Fund.....

129,000.00

Seed Farm, Acts 3443 and 3624.....

104,871.32

Tobacco Fund, Acts 2613 and 3179.....

45,342.16

BUREAU OF ANIMAL INDUSTRY

Stockherds and farms, breeding stations and slaughterhouses, Acts 2758 and 3632

P14,464.83

BUREAU OF LANDS

Verification Survey Fund

18,382.70

Cadastral Survey Fund

179,636.35

Reverend Crisostomo Donation Fund

12,285.06

Public Lands Sub-Division Fund

58,497.23

Friar Lands Estates

122,172.33

San Lazaro Estates

8,428.38

BUREAU OF COMMERCE

Rice and corn fund

26,596.09

Rice and corn fund

1,128,060.32

Transfer of appropriations.—To meet the requirements of the various activities of the bureaus and offices under the Department, certain transfers of appropriations had to be made as follows:

	Salaries and wages	Sundry expenses	Furniture and equipment	Special appropriations	Total
Total account of appropriations.	P3,373,638.00	P845,804.00	P32,674.00	P235,032.00	P4,487,146.00
Forced savings.	(203,032.00)	(10,628.03)	(21.35)	(.98)	(213,683.00)
Net amount available from the Appropriation Act.	3,170,605.34	835,175.97	32,652.67	235,031.02	4,273,463.00
Transferred from special appropriation to salaries and wages.	5,370.00			(5,370.00)	
Transferred from salary savings to sundry expenses, furniture, and equipment, and special appropriations.	(320,078.10)	245,368.60	30,886.50	43,823.00	
Transferred to National Library	(432.00)	(370.00)			(802.00)
Net amount of adjusted appropriation	2,855,465.24	1,080,174.57	63,537.17	273,484.02	4,272,661.00

Allotment of adjusted appropriations.—The distribution and allotment to the various bureaus and offices of these adjusted appropriations stand as follows:

Bureau or office	Salaries and wages	Sundry expenses	Furniture and equipment	Special appropriations	Total
Office of the Secretary.....	\$40,319.00	\$43,097.40	\$6,418.00	\$1,701.00	\$91,535.40
Fish and Game Administration.....	42,965.00	14,130.00	2,000.00	.....	59,095.00
Mineral Resources.....	26,146.00	9,407.50	2,520.00	.....	38,073.50
Home Economics.....	16,383.00	9,435.00	1,315.00	.....	27,132.00
Navigation.....	276,715.08	181,517.00	996.00	.....	459,228.00
Accounts and Property.....	128,161.30	20,045.00	3,220.50	.....	151,426.80
Statistics.....	22,366.00	5,787.00	2,293.00	.....	30,446.00
Scientific Library.....	24,888.18	25,447.00	1,252.00	.....	51,587.18
Publications.....	23,511.00	19,878.35	3,256.00	.....	46,645.35
Total for office of the Secretary and Special Divisions.....	601,452.56	328,744.25	23,270.50	1,701.00	955,168.31
Plant Industry.....	247,644.25	146,225.02	13,500.00	37,700.00	445,069.27
Animal Industry.....	210,593.06	123,742.00	1,010.17	59,999.02	405,344.25
Forestry.....	302,879.24	94,563.13	6,750.00	26,720.00	430,912.37
Lands.....	818,163.72	139,193.50	3,055.50	114,054.00	1,074,466.72
Science.....	234,324.17	102,788.09	13,913.00	.....	369,025.26
Commerce.....	128,308.24	54,002.58	3,723.00	20,400.00	206,433.82
Weather.....	92,100.00	91,916.00	249.00	2,910.00	187,175.00
Total allotted and distributed.....	2,855,465.24	1,080,174.57	63,537.17	273,484.02	4,272,661.00

Expenditures from allotments.—Against the foregoing distribution of allotments, the following expenditures and other charges were incurred:

Bureau or office	Salaries and wages	Sundry expenses	Furniture and equipment	Special appropriations	Total
Office of the Secretary.....	\$38,187.45	\$41,532.23	\$6,417.71	\$278.50	\$86,435.89
Fish and Game Administration.....	41,644.48	13,406.45	1,930.34		57,041.27
Mineral Resources.....	25,947.59	9,355.65	2,519.00		37,822.24
Home Economics.....	16,345.23	9,147.61	1,306.63		26,799.49
Navigation.....	275,472.17	180,265.61	995.20		456,732.98
Accounts and Property.....	127,909.07	19,519.51	3,217.40		150,645.98
Statistics.....	22,268.68	5,721.60	2,284.23		30,274.51
Scientific Library.....	24,589.05	25,188.43	1,242.09		51,019.57
Publications.....	23,347.51	19,410.13	3,256.36		46,013.90
Total for Office of the Secretary and Special Divisions.....	595,711.25	323,567.92	23,227.96	278.50	942,784.33
Plant Industry.....	247,644.25	144,155.73	13,500.00	37,530.81	442,840.79
Animal Industry.....	210,533.06	122,742.00	1,010.17	69,999.02	404,344.25
Forestry.....	502,879.24	32,372.82	5,719.24	26,645.69	628,616.90
Lands.....	791,586.61	124,536.33	3,034.88	96,464.79	1,015,622.61
Science.....	254,324.17	102,788.09	11,913.00	.....	369,025.26
Commerce.....	128,308.24	53,944.80	3,783.68	20,395.34	206,437.06
Weather.....	91,051.96	86,106.16	32.03	2,836.38	180,026.53
Total expended and obligated.....	2,822,078.78	1,050,243.15	63,225.96	254,150.53	4,189,698.42

Comparing the total allotments and expenditures, we have the following results:

	Salaries and wages	Sundry expenses	Furniture and equipment	Special appropriations	Total
Total allotted and distributed.....	\$2,855,463.24	\$1,080,174.37	\$63,537.17	\$273,484.02	\$4,272,661.00
Total expended and obligated.....	2,822,078.78	1,050,243.15	63,225.96	254,150.53	4,189,698.42
ACTUAL SAVINGS MADE AND RETURNED TO UNAPPROPRIATED SURPLUS IN ADDITION TO THE FORCED SAVINGS.....	33,386.46	29,931.42	311.21	19,333.49	82,962.58

FINANCIAL RECOMMENDATIONS

To enable the Department to wage prompt, steady, and effective campaigns against destructive plant pests and diseases, it is recommended that a law be enacted making available annually the ₱120,000 appropriated by Act No. 4065 for the control of plant pests and diseases.

In view of limited funds a law should be enacted amending the local Plant Quarantine Law (Act No. 3027) so that the fees collected from plant quarantine inspections, certification, and fumigation, and the fees derived from the burning and destroying of prohibited plant materials, are collectively made a revolving fund to be spent for the improvement of plant quarantine work and inspection service.

A law should be enacted requiring each province to set aside annually a certain percentage of its revenues for the control or extermination of plant pests and diseases.

It is also suggested that arrangement be made with the Secretary of Finance for the immediate release of the funds already appropriated under Act No. 3953, otherwise known as the Vamenta Act for the promotion of new and the improvement of existing industries.

It is recommended that Act No. 2758, providing for a revolving fund for the Bureau of Animal Industry, be amended so as to include the operation of the Animal Products Division of the said Bureau in the projects covered by the revolving fund.

Efforts were exerted this year to secure the passage of a bill appropriating ₱50,000 for a campaign against foot-and-mouth disease, but the efforts proved fruitless. It is, therefore, recommended that the proposed appropriation for the control of this disease be again urged upon the Legislature.

It is recommended that the Bureau of Forestry be given an additional outlay for scalers in order to enable it to carry out the enforcement of the forest laws and regulations in order to increase the revenues of the Government.

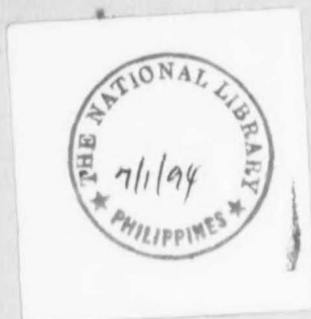
It is likewise urged that a general increase in the appropriation of the Bureau of Forestry be made in order to enable that Bureau to carry out necessary projects for the ensuing year. It is needless to state that for every cent spent in the administration of public forests a corresponding amount, generally more, accrues to the insular coffers.

It is recommended that an amount be set aside for permanent positions to fill fourteen new district land offices.

In order to spread the benefits of the services of the Bureau of Commerce in the provinces it is recommended that a sufficient sum be set aside for positions in the district commercial agencies of the Bureau.

The Rice and Corn Fund (Act No. 2818) should be further amended to make part of the fund available for loans to co-operative marketing associations organized under Act No. 3425.

It is recommended that the manufacture of tikitiki extract by the Bureau of Science be continued, and for this purpose it is urged that an appropriation of ₱30,000 be set aside by the Legislature.



III. PROGRESS ON SPECIAL OBJECTIVES

I. AGRICULTURAL PROGRESS

Plant sanitation.—The campaign for the control and extermination of locusts which seriously infested practically all the provinces of the Visayas and Mindanao demanded so much attention that several other activities had to be held in abeyance or entirely abandoned. Although the locust infestation of 1933 was severe, there was considerable success in minimizing its ravages through systematic methods and persistent efforts. Rehabilitation work on farms devastated by the pest had to be carried out simultaneously with the campaign against the pest in order to avert famine. In serious cases where farmers were rendered practically destitute and had no means to acquire planting materials, seeds were given away free and planted under the direction of competent men. Locusts still appear in certain places but their control is only a question of time. Other destructive pests and diseases of economic plants were also attended to and in many cases serious damages were prevented. The most important of these were the leaf miner, rice stem borer, rice bug, rice cutworm, rats, and diseases of sugar cane, abacá, fruit trees, and vegetables.

Extension.—A mass of useful information to farmers was given out. There were participations in several agricultural exhibitions and provincial and municipal fairs. The most noteworthy was the participation in the Second Horticultural Show in the 1933 Carnival in Manila. The program of crop diversification was carried out in different provinces and as a result new crops with economic possibilities such as cotton, wheat, Bermuda onion, Virginia and Turkish Leaf tobacco, have been planted on a large scale. The campaign to enlighten the farmers in the use of selected seeds and of improved and scientific methods of cultivation received full-hearted coöperation, and now many farmers are intelligently engrossed in their work, putting into practice such scientific methods and using such farm implements as are within their means. The planting of home and commercial orchards was also encouraged. In order to help out the tenants of the rice-producing provinces of Central Luzon, rural improvement work was inaugurated in several towns.

Research.—Research work on different economic plants and a special study on fern were undertaken. It has been shown that a species of fern can be grown economically in the Islands. Work on cigarettes and cigarette leaves of aromatic and non-aromatic types of locally grown tobacco and the study of the proper methods of blending and flavoring them for the manufacture of high-grade cigarettes were carried out. Soils from different parts of the Islands were analyzed. Analyses of the different varieties of Derris for their rotenone contents were made with a view to encouraging the production of this useful plant. Plant utilization work was specially active during the year. Various investigations on preserving, canning, fermenting, pickling, and the preparation of rice and other kinds of flour and their commercial utilization, were made. Rice flour has now become an added commodity in the local market as a result of efforts to popularize it. Judging from the demand for this product, it may be safely predicted that before long it will become one of the established industries in the Islands.

Industrial investigations.—Investigations on the utility of coarse abacá fiber made possible the adoption by many tobacco merchants of coarse abacá sack cloth for bailing tobacco. The making of looms for weaving double-width cloth for sack-making and for rag-weaving was established, and the results showed that the cost of weaving abacá sack cloth can be reduced substantially. The study of eliminating the knots in the manufacture of abacá yarn has also been started. The manufacture of abacá sack cloth is now an established industry in many abacá-producing provinces.

Plant propagation.—There was a marked increase in the demand for seeds and other planting materials during 1933. The large orders for planting materials of fruit trees show that the people have already realized the advantages of home and commercial orchards. There was also a great increase in the demand for vegetable seeds.

2. PROGRESS IN THE LIVESTOCK INDUSTRY

Local meat supply.—There was a slight growth in the animal population of the Philippines as a result of better control of epizootics during the year. The cattle industry has reached the stage where it is no longer necessary to import live cattle for beef purposes from other countries, cattle ranches all over the country being in a position to supply the local market with all the fresh meat that it consumes. However, frozen beef importa-

tion has continued as before, as well as the importation of canned beef. This fact is not an indication of the inability of the Islands to supply its own beef, but on the contrary, it shows that there are latent possibilities for the expansion and promotion of the packing industry in this country. Not only is the demand for fresh beef cattle sufficiently supplied locally, but also pork and other animal products were produced in sufficient quantities. In view of this, it is believed that it is now high time to start the industrialization of animal products.

Rinderpest campaign.—The fight against rinderpest continued as heretofore. Circumstances beyond control have led to the delay of the campaign for the ultimate eradication of this disease and prevented the carrying out of a plan for a more effective distribution of technical men at danger points. One of the factors that prevent the final eradication of the disease is the fact that the wet vaccine now used in the campaign is not convenient for use in mountainous regions. However, the manufacture of dry vaccine which can be carried to places without facilities for refrigeration will help the situation.

Foot-and-mouth disease.—Foot-and-mouth disease broke out in April and its place of origin was in certain provinces of Mindanao and the Visayas. Manila and its environs were visited by the disease through cattle shipments for slaughter purposes from these places. For a time the infection attained alarming proportions and drastic and strict regulations were forthwith promulgated. As a result of this outbreak, approximately 26,000 animals were affected, with 346 deaths. The control measures adopted provoked strong protests from cattlemen in view of the fact that such measures had the effect of stopping shipments from ranches infected with the disease, and thus practically paralyzed the free traffic of beef animals from the Visayas and Mindanao and threatened persons having contracts to fulfill in the city and elsewhere with financial loss. The cattlemen, however, were pacified when it was shown to them that the protested measures were intended to protect the livestock industry as well as the interests of the cattle trade itself.

Slaughterhouse Case.—On December 13, 1933, the Supreme Court of the Philippine Islands rendered a decision affirming the decision of the lower court of Manila, ruling that municipal governments do not have exclusive power over the establishment of slaughterhouses within their jurisdiction. This case started in 1931 when the City of Manila on the one hand, and the Phil-

ippine Livestock Coöperative Association and the Bureau of Animal Industry on the other, were involved in a law-suit generally known as the Slaughterhouse Case. The trial court had rendered a decision of the case in favor of the Cattle Association and the Bureau of Animal Industry, and the City of Manila appealed the case to the Supreme Court.

3. PROGRESS IN FORESTRY

Lumbering activities.—Largely due to increased activities of exporting sawmills, lumbering operations during the year were more active than during the previous year. The total timber cut during the year was 1,085,313 cubic meters as compared with 1,018,909 cubic meters last year, or an increase of 6 per cent. There were 110 sawmills and machine logging operations in force in the course of the year as compared with 106 in 1932. However, despite the increase in the number of sawmills the total investment in connection therewith declined to ₱27,000,000 from ₱33,000,000 of last year. This was due to the fact that a few small mills did not renew their licenses during the year and that two fairly large lumber companies were declared insolvent.

Foreign markets for Philippine lumber registered gains during the year. There were shipped abroad 71,145,928 board feet of lumber and timber as against 50,628,144 board feet in 1932, or an increase of 40 per cent. As usual, the bulk of the shipments went to Japan, United States, China, Great Britain, and South Africa.

General service.—From June 15 to December 31, 1933, two forest reserves covering an area of 1,113.489 hectares, one national park containing 3,714.0274 hectares, 30 communal forest having an area of 4,443.54 hectares, four communal pastures covering 1,251.55 hectares, and four other special reserves totaling 27.07 hectares, were proclaimed or established. Besides, there were handled 1,632 ordinary land registration cases involving 19,535.90 hectares and 90 cadastral cases covering 194,106.1077 hectares, 242 cases of claims to forest lands were decided and 27 parcels of private woodland with an area of 1,736.30 hectares were registered. Seven conflicts between forest users were settled, and 761 cases of illegal *cainġin* involving a total area of 1,305.86 hectares with corresponding regular and additional forest charges amounting to ₱100,384.62 were detected. Likewise, there were 1,682 applications for special permits inspected, 268 new permits covering about 5,817.15 were issued, while 566 old permits covering 9,268.01 hectares were renewed

or extended. In spite of the financial depression ₱13,838.74 were collected as rentals. Seventy-one projects of land classification embodied in 52 maps containing a total area of 315,859.36 hectares, were certified to the Department Secretary, while 964 individual applications containing 12,019.46 hectares were certified to the Director of Lands.

4. PROGRESS IN THE ADMINISTRATION OF PUBLIC LANDS

Disposal of public lands.—The disposition of agricultural public lands through homestead, sale, lease, and free patent has not been as extensive as in previous years. Both the number of applications and the area of the lands applied for showed considerable decrease this year as compared with last year. As regards the friar land estates, in 1933 there was paid the sum of ₱12,023,610.39 representing the total sales value of 42,306 lots covering an aggregate area of 70,066 hectares, as against ₱1,544,210.33 representing the total sale value of 3,688 lots covering an aggregate area of 8,686 hectares paid up in 1932.

San Lazaro Investment Fund.—An intensive and extensive campaign has been inaugurated for the purpose of liquidating accounts due the San Lazaro Investment Fund. However, all possible considerations were given the mortgagors to liquidate their accounts and only in extreme cases was the filing of complaints to enforce payments been resorted to. At the close of the year the San Lazaro Investment Fund had a total of ₱171,000 invested as compared with ₱165,000 at the beginning of the year. The total operating capital at the end of the year was ₱1,935,270.04, and a total of outstanding loans, bonds, and advances of ₱1,813,657.27, so that the total amount available for loan by the end of the year was ₱121,612.77.

5. COMMERCIAL PROGRESS

Made-in-the-Philippines products campaign.—Great progress was made in 1933 towards the patronage and consumption in the local market of Philippine products. Experience has shown that most of the articles now locally produced and manufactured can find a good demand in the local market, provided that they are properly introduced and systematically advertised. For this reason a campaign had been launched in the past to popularize and sell Philippine-made articles. The year 1933 has been so far the most successful in pushing this campaign. The various expositions conducted in Manila and in the provinces succeeded in bringing these native products to the attention of the domestic

market. To help the campaign, the Manila Trading Center and Exchange was established in August, 1933, and subsequently Act No. 4069 was enacted providing the necessary funds for carrying on the campaign more intensively. In August also the Governor-General issued a proclamation for a "Made-in-the-Philippines-Products Week" which helped greatly in drawing the attention of the people towards the aims and objectives of the campaign.

Greater interest in business.—Considerable progress was made in 1933 towards the inculcation of the spirit of practical economic-mindedness among the people to increase their interest in business and induce them to take an active part in the trade of the country. The means used in this campaign has been mainly educational. Trade information service was used extensively. In order to promote the spirit of coöperation and organization among Filipino businessmen and also to reach them more regularly and effectively, and to develop more contacts with them, weekly luncheons for Filipino businessmen were inaugurated. Those who attended these luncheons were given information on prices and general market conditions. In 1933, the Philippine Economic League was organized, being composed of prominent Filipino merchants and industrialists and members of the Legislature especially interested in the economic development of the country.

Filipino participation in retail trade.—Another objective that gained headway in 1933 was that of increasing Filipino participation in the retail business of the Islands which is now controlled by alien residents. A survey of the retail business in Manila was made during which the problems confronting the Filipino retail stores were studied. Owners of Filipino retail stores formed an association known as "Samahan ng Tindahang Sari-Sari." In February, 1933, a convention of Filipino retail merchants from different parts of the Islands was called, the purpose of which was to bring Filipino retailers in touch with one another to discuss their common problems. Demonstrations were made of model sari-sari stores and folders issued containing pointers and practical information on how to start and manage a sari-sari store.

Financing small producers.—In connection with the organization of coöperative marketing associations and agricultural credit coöperative associations, work was started towards the establishment of a system of financing small Filipino farmers in order to free them from the danger of exploitation by usurious

money lenders. Some progress was made during the year in this direction. With the coöperation of the Philippine National Bank, loans or advances were made available to individual producers affiliated with coöperative marketing associations. Tobacco farmers and copra producers were materially aided during the year. The same financial aid was extended to the producers of rice and other domestic crops.

Produce exchanges.—The opening of the Produce Department of the Manila Trading Center and Exchange was a step forward in the establishment of produce exchanges especially for the benefit of local producers. Many planters and dealers in agricultural products avail themselves of the services of the Produce Department. It is intended to expand the activities of this Department in order to establish permanent produce exchanges operated on a modern basis.

Export trade in rice.—There was considerable progress in the development of the export trade in rice. Trial shipments of Philippine rice to the United States were made through the Produce Department of the Manila Trading Center. The importers who bought these shipments valued at ₱15,000 are regular consumers of the cereal and need at least 500 tons of rice a month. At the current price this would mean about ₱100,000. This American demand is now being supplied largely from Siam. Some objections have been made to the quality of Philippine rice on account of the high percentage of broken grains, but it is expected that this difficulty will be overcome by having the mills secure the necessary equipment to produce the desired quality. If the desired quality of rice is produced here it is expected that the American market can buy from the Philippines rice worth at least ₱1,000,000 a year.

Manila stock market.—It was not until 1933 that a really active stock market was definitely established in Manila. So active had the market become toward the later part of the year that two additional stock exchanges were organized in order to cope with the big volume of this business that has arisen, so that today there are in the city three different stock exchanges. Although the volume of business in the stock market declined toward the end of the year, the unprecedented activity shown in August and September had gone far in educating the public to this form of transaction.

Provincial trade promotion.—An important step towards trade promotion service in the provinces was made in 1933 with

the organization of district agencies. Many of these district offices have started to function and will be fully organized as the necessary facilities become available.

6. SCIENTIFIC PROGRESS

Paper industry.—Government researches in the past resulted in the establishment of numerous industries and the improvement of a great many more, while the possibilities of other industries have been pointed out. Such researches included those made on glass, vitrified brick, medicinal remedies, plants and oils, and other materials of possible industrial value to the Islands. This year investigations on the industrialization of paper manufacture were continued. A paper machine was set up and improvements were made from time to time. This machine amply demonstrated the possibility of manufacturing paper locally from raw materials which abound in the Philippines. It has been shown that several kinds of local grass and the softer species of Philippine woods are suitable raw materials for paper manufacture.

Ceramic investigation.—Ceramic investigations with the object of improving the quality of the local pottery, fire brick, and other ceramic products, were continued. As a result of studies in local clays it has been found possible to cover red burning clays such as those of Pasig and Tinajeros with a white body, thus making possible the manufacture of white tiles locally, the large demand for which is entirely supplied now by foreign markets. Samples of art pottery, glazed and vitrified wares, tiles, fire bricks, sewage pipes, and wares made from Philippine material, show the great possibilities in the ceramic industry.

Health work.—The Department, through the Bureau of Science, helps in the campaign against human diseases by manufacturing vaccines and serums in large quantities for the Bureau of Health. In 1933, there were sold to the Bureau of Health 472,500 doses of vaccines against cholera-dysentery, typhoid, cholera-typhoid, dysentery, and smallpox, and also received free of charge 14,596,913 units of vaccines against these diseases. Considerable amounts of other products were either sold or furnished free to the Bureau of Health.

Free examinations.—During the year there were examined free for the Bureau of Health 4,560 samples of foods, alcohol and beverages, 4,210 samples of water, and 64,232 rats for

plague. In all, free examinations for the Bureau of Health were made of 72,053 specimens.

Chemical investigations.—Philippine rice-mill products, particularly rice bran, were investigated during the year. The result on four examinations, namely, Philippine rice mills, deterioration and preservation of rice bran, and a method for testing fat-splitting enzyme activity were published. An investigation on the composition of tropical woods with a view, finally, to determining their chemical properties that can be utilized in the industries, was accomplished. Investigations on tan barks and various classes of vegetable oils were conducted to determine their suitability for commercial purposes.

7. PROGRESS OF WEATHER WORK

The track of each typhoon of the year was ascertained and plotted. The synoptic weather service was maintained without a single failure. Special attention was paid to the study of air masses and fronts. Special investigation of a very deep earthquake which occurred in Mindanao on April 8, 1929, was undertaken. The relation between microseisms and typhoons was investigated. Part was taken in the world-wide redetermination of longitudes. Coöperation was maintained with foreign services in connection with the International Polar Year, *Re-seaux Mondial*, Northern Hemisphere Weather Map, and special seismic investigations.

Prior to June, 1933, the reduction in the appropriation and the necessity of maintaining the forecasting division necessitated the almost total suppression of the net of rain stations throughout the Archipelago to the great detriment of the agricultural communities. After June, 1933, great progress was made in bringing up to date the monthly bulletins and scientific annual reports that had been kept behind since 1918, and preparations have been made for the study of the upper air by means of pilot balloons.

8. PROGRESS OF THE MINING INDUSTRY

The mining boom may be said to have begun in the Philippines in July, 1933. During the year 42,737 mining claims were located in thirty-four provinces, covering approximately 382,499 hectares, as compared with 1,011 claims in twenty-four provinces, covering approximately 9,662 hectares for 1932. Of the total area of mining claims staked in 1933, 364,590 hectares are

covered by lode claims and 17,909 hectares by placer claims. Since August the total number of assays received in the Division of Mineral Resources increased by leaps and bounds so that the capacity of the assay laboratory was taxed to the limit. The increase was from 59 samples in January to 158 samples in July and 971 samples in November. On account of the great number of mining claims located in some of the provinces it was necessary for technical men to make trips to the offices of mining recorders to help them straighten out their records and to acquaint them with the general provisions of the mining laws and regulations. During the year 617 location surveys of mining claims were ordered. Twenty-three lode patent surveys were likewise ordered.

IV. REORGANIZATION

Complying with the requirements of the Reorganization Law of 1932, Act No. 4007, this Office began on January 16, 1933, to reorganize the Department of Agriculture and Commerce. The reorganization has been completed.

The Reorganization Law of 1932, Act No. 4007, abolished the Department of Agriculture and Natural Resources, which had been created by Act No. 2666, approved on November 18, 1916. Under said Department had been placed the Bureau of Agriculture, which later was divided into a Bureau of Plant Industry and a Bureau of Animal Industry; the Bureau of Forestry; the Bureau of Lands; the Bureau of Science; the Weather Bureau; matters pertaining to colonies and plantations on public lands; matters concerning hunting, fisheries, sponges, and other sea products; and the National Museum of the Philippine Islands, which was organized a few years later. All these administrative units together with the Bureau of Commerce, which had previously been under the Department of Commerce and Communications, were transferred to the Department of Agriculture and Commerce by Act No. 4007.

The reorganization of the Department of Agriculture and Commerce has been carried out strictly in compliance with the requirements of the Reorganization Law of 1932, Act No. 4007, which granted the Secretaries of Departments full authority to suppress or reduce any activity under their respective Departments, transfer an activity from one division to another, add a new activity to any division, or consolidate into one or more divisions all activities and functions of a similar nature of the different bureaus and offices of their respective Departments. As a measure to safeguard public interest, it provided further that no transfer, addition, or consolidation should be made that would result in duplication of work, and that the personnel of such divisions or services as might be placed under the immediate supervision of the Department Head should be subject to all the provisions of the civil service law, rules, and regulations governing the classified service.

The reorganization of the Department of Agriculture and Commerce had the following objectives in view:

(a) To promote efficiency by consolidating all functions and activities which were closely related and interdependent, and

those which were of a similar nature in the different bureaus and offices of the Department.

(b) To effect economy by systematic simplification of the internal organization of the bureaus, offices, and services of the Department, and by the retirement of personnel whose services were no longer necessary.

In view of the inconveniences which the public might suffer if the reorganization were not to be effected within a reasonably short time, it was decided that the task should first be directed to the consolidation of related and interdependent functions and activities heretofore performed by different bureaus. After this had been accomplished, the internal reorganization of each bureau was taken up.

The development and promotion of agriculture, industry, and commerce constitute the task assigned by law to the Department of Agriculture and Commerce. Hence, a comprehensive plan for carrying out this task would call for a practical scheme of grouping on the basis of correct principles all the functions and activities. Consequently the departmental organization has been divided into three main groups which deal with the development of natural resources, the promotion of commercial and industrial enterprises, and the development of agricultural industries, with a fourth group rendering services of a general nature common to the various units of the Department. Each of these groups has definite functions and activities to perform, covering specialized fields and requiring the services of trained technical personnel.

Heretofore each Bureau was practically an independent unit, with the result that in too many cases activities were undertaken which were of a nature similar to activities being undertaken in other Bureaus of the same or of other departments. It may also be of interest to note that in the course of years too many divisions were created in the various Bureaus, with the result that executive staffs of some of them were top-heavy. Chart 1 showing the scheme of the organization of the Department of Agriculture and Commerce January 1, 1933, shows clearly the different units involved. This chart may profitably be compared with Chart 2 which shows the scheme after the reorganization on June 1, 1933.

The extensive agricultural lands, timber lands, and valuable mineral deposits, the wild animals of our forests, the fisheries, sponges and other valuable sea products, constitute our natural resources, the effective development of which calls for appropriate

organization. It is for this reason that the Bureau of Lands and the Bureau of Forestry were not consolidated. However, each has been reorganized, and activities which were related to and interdependent with similar activities of other Bureaus of the Department, were transferred and consolidated with other appropriate units.

For the development of natural resources, the reorganization of the Department of Agriculture and Commerce provides four separate services as follows:

- a. Bureau of Lands,
- b. Bureau of Forestry,
- c. Division of Mineral Resources,
- d. Fish and Game Administration.

On January 1, 1933, the functions and activities of the Bureau of Lands were attended to by the following divisions:

1. Administrative Division,
2. Public Lands Division,
3. Mineral Lands Division,
4. Division of Surveys,
5. Inspection Division,
6. Law Division,
7. Accounting and Property Division,
8. Friar Lands Division.

A detailed study of the various laws governing agricultural and mineral lands, friar lands, and other real-estate property of the Government, private and government land surveys, etc., revealed the fact that there were several functions and activities related to or interdependent with those of other bureaus. As reorganized, the Bureau of Lands consists of the following functional divisions:

1. Public Lands Division,
2. Friar Lands Division,
3. Law Division,
4. Division of Surveys.

It will be noted that from eight divisions, the functions and activities of the Bureau of Lands have been consolidated and distributed to four functional divisions.

The functions and activities of the Mineral Lands Division of the Bureau of Lands, together with those of the Division of Geology and Mines of the Bureau of Science and the miscellaneous functions and activities of the Bureau of Forestry

relating to mineral products, were all transferred and consolidated to form the new Division of Mineral Resources.

The functions and activities of the Accounting and Property Division were transferred and consolidated with those of similar divisions of other bureaus, to form the new Division of Accounts and Property.

The Inspection Division and the Administrative Division, both of the Bureau of Lands, were abolished as divisions and such of their activities which do not properly belong to any of the four functional divisions of the Bureau, were transferred, consolidated, and placed in the Office of the Director under the immediate general supervision of the Director of Lands. The details of this supervision will be attended to by the Assistant Director and the chief clerk of the Bureau of Lands.

The reorganization of the Bureau of Lands was carried out pursuant to Memorandum Order No. 31, dated May 31, 1933, and effective June 1, 1933.

On January 1, 1933, the Bureau of Forestry consisted of the following divisions:

1. Division of Forest Management,
2. Division of Licenses,
3. Division of Timber Concessions,
4. Division of Forest Investigation,
5. Division of Forest Products,
6. Division of Forest Lands and Regulations,
7. Division of Forest Fauna and Grazing,
8. Division of Forest Engineering,
9. Administrative Division.

The enforcement of the various laws concerning public forests, forest reserves, national parks, game, mineral products within forests, etc., was carried out by the foregoing nine divisions. An analysis of the functions and activities of these divisions, and of the laws which the Bureau of Forestry had been in charge of enforcing, brought out the fact that it was possible to simplify and systematize the bureau's organization by appropriate consolidation of related and interdependent activities. As reorganized the Bureau of Forestry consists of the following functional divisions:

1. Division of Forest Studies and Research,
2. Division of Forest and Range Management,
3. Division of Forest Concessions,
4. Division of Forest Delimitation and Improvement.

The functions and activities of the Division of Forest Fauna and Grazing were transferred and consolidated with those of the Division of Fisheries and the Division of Zoölogy, both of the Bureau of Science, to form the new unit known as the Fish and Game Administration.

All the other divisions were abolished and their functions and activities were coördinated, consolidated, and reassigned to the four functional divisions into which the Bureau of Forestry has been reorganized. All matters not belonging properly to these functional divisions have been transferred and consolidated under the Office of the Director, as in the case of the Bureau of Lands.

The reorganization of the Bureau of Forestry was carried out pursuant to Memorandum Order No. 30 dated May 31, 1933, and effective June 1, 1933.

The Division of Mineral Resources was organized for the purpose of placing under one responsible direction the enforcement of the provisions of the Act of Congress of July 1, 1902, pertaining to the mineral lands; of Act No. 2719 on coal lands, of Act No. 2932 on petroleum lands; and of all other acts amendatory thereof or relative to mineral lands, mines, mining, guano, stones, earths, and other mineral products, together with the study of the geology and mineral resources of the Philippines and the promotion of the mining industry, which heretofore had been scattered in different offices of the Department, such as the Bureau of Lands, the Bureau of Science, and the Bureau of Forestry.

The creation of the Division of Mineral Resources made it possible to abolish the Division of Mineral Lands of the Bureau of Lands and the Division of Geology and Mines of the Bureau of Science, and to relieve the Bureau of Forestry from the necessity of attending to mineral products within forests.

The organization of the Division of Mineral Resources was carried out by Memorandum Order No. 5 of January 25, 1933, effective February 1, 1933.

The Fish and Game Administration was organized for the purpose of placing under one responsible direction the enforcement of the provisions of Act No. 4003 recently enacted by the Philippine Legislature, generally known as the Fisheries Act; to protect game and fish as required by Act No. 2590, as amended, entitled "An act for the protection of game and fish;" and in general to develop the fishing industry in the Philippines and to carry out the purposes of the Reorganization Law of 1932

which placed under the Department of Agriculture and Commerce all matters pertaining to fisheries, sponges, and other sea products. Many of these activities had heretofore been attended to by the Bureau of Science and the Bureau of Forestry.

The creation of the Fish and Game Administration made it possible to abolish the Division of Forest Fauna and Grazing of the Bureau of Forestry, and the Division of Fisheries and the Division of Zoölogy of the Bureau of Science.

The organization of the Fish and Game Administration was carried out by Memorandum Order No. 4 of January 24, 1933, effective February 1, 1933.

For commercial and industrial promotion, the reorganization of the Department of Agriculture and Commerce provides four separate services, as follows:

- a. Bureau of Commerce,
- b. Bureau of Science,
- c. Weather Bureau,
- d. Division of Navigation.

On January 1, 1933, the functions and activities of the Bureau of Commerce were carried out through the following divisions:

1. Administrative Division,
2. Accounting Division,
3. Division of Commercial Information and Publications,
4. Division of Commercial Investigation and Trade Promotion,
5. Division of Statistics and Trade Analysis,
6. Division of Industrial Promotion and Organization,
7. Division of Commercial Laws,
8. Navigation Division.

A study of the various laws enacted for the development and expansion of the domestic and foreign trade of the Philippines, and the promotion of industries, convinced us that the enforcement of all laws regulating and promoting trade and industry could be handled very well by a smaller number of divisions. Consequently, the Bureau of Commerce was reorganized into the following functional divisions:

1. Trade Promotion Division,
2. Trade Regulation Division,
3. Industrial Promotion Division,
4. Coöperative Marketing and Credits Division.

Miscellaneous activities not belonging properly to the functional divisions have been transferred to the Office of the Director.

The Accounting Division was abolished and its functions and activities, together with those of a similar nature in other bureaus, were consolidated to form the new Division of Accounts and Property of the Department.

The Division of Statistics and Trade Analysis was abolished, and its functions and activities, together with those of a similar nature in other bureaus, were consolidated to form the new Division of Statistics of the Department.

The Division of Commercial Investigations and Trade Promotion of the Bureau of Commerce was abolished, and its functions and activities pertaining to coöperative marketing associations were consolidated with the functions and activities of the Agricultural Economics Division of the Bureau of Plant Industry which was also abolished; the consolidated functions and activities of both divisions were assigned to the new Coöperative Marketing and Credits Division of the Bureau of Commerce organized pursuant to Memorandum Order No. 11, dated February 28, 1933, effective March 1, 1933.

The Division of Trade Regulation was organized to provide for a unified control of the enforcement of all laws regulating trade and industry, which heretofore had been performed by the Bureau of Commerce and the Bureau of Science.

The reorganization of the Bureau of Commerce was carried out pursuant to Memorandum Order No. 33 dated May 31, 1933, and effective June 1, 1933.

The Reorganization Law of 1932 transferred the Division of Anthropology, the Division of Natural History, the Division of Industries, and the Administrative Division of the National Museum of the Philippine Islands to the Bureau of Science. It also transferred the Division of History and the Division of Fine Arts of the National Museum to the National Library, so that, as of January 1, 1933, the Bureau of Science had the following divisions:

1. Biology Division,
2. Organic Chemistry Division,
3. Inorganic Chemistry Division,
4. Geology and Mines Division,
5. Fisheries Division,
6. Botany Division,

7. Soils and Fertilizers Division,
8. Zoölogy Division,
9. Food Preservation Division,
10. Administrative Division,
11. Division of Anthropology,¹
12. Division of Natural History,¹
13. Division of Industries,¹
14. Administrative Division,¹

It may readily be realized from the preceding list of divisions that the need for a thorough overhauling of the Bureau was imperative. Certain activities could best be attended to by consolidation with other units of the Department. As reorganized, the Bureau of Science consists of the following functional divisions:

1. Division of Tests and Standards,
2. Division of Chemical Research,
3. Division of Biological Products,
4. Division of Industrial Engineering,
5. National Museum Division.

As in the case of the Bureau of Lands, the Bureau of Forestry, and the Bureau of Commerce, all functions and activities not belonging properly to the functional divisions were transferred to the Office of the Director.

The reorganization of the Bureau of Science was carried out pursuant to Memorandum Order No. 32 dated May 31, 1933, and effective June 1, 1933.

On January 1, 1933, the Weather Bureau consisted of the following Divisions:

1. Meteorological Division,
2. Seismic and Magnetic Division,
3. Astronomical Division,
4. Administrative Division.

The Weather Bureau was least affected by the reorganization. The only change made consisted in the abolition of the Administrative Division, and the placing of its functions and activities, together with other functions and activities heretofore performed by the other divisions not belonging properly to functional divisions, under the immediate general supervision of the Director of the Weather Bureau, the details being attended to by the Assistant Director and the chief clerk.

¹ Transferred from the National Museum of the Philippine Islands.

The following are the functional divisions of the Weather Bureau:

1. Meteorological Division,
2. Seismic and Magnetic Division,
3. Astronomical Division.

The reorganization of the Weather Bureau was carried out pursuant to Memorandum Order No. 34 dated May 31, 1933, and effective June 1, 1933.

The Division of Navigation was organized to carry out the provisions of existing laws concerning the construction, repair, maintenance, and operation of vessels, the maintenance, lighting, inspection, and superintendence of lighthouses, and in general to attend to matters which have to do with interisland water transportation. The functions and activities of the Division of Navigation of the Bureau of Commerce were transferred to the Division of Navigation as organized by Memorandum Order No. 25, dated May 20, 1933, and effective June 1, 1933. By this transfer the personnel of the Bureau of Commerce is able to devote its efforts entirely to functions and activities which have to do with the promotion and development of trade and industry, leaving matters concerned with interisland water transportation and aids to navigation under the direct control and supervision of the Secretary of Agriculture and Commerce.

For the development of agricultural industries, the reorganization of the Department of Agriculture and Commerce provides four separate services, as follows:

- a. Bureau of Plant Industry,
- b. Bureau of Animal Industry,
- c. Fiber Inspection Service,
- d. Division of Home Economics.

On January 1, 1933, the functions and activities of the Bureau of Plant Industry were carried out by the following divisions:

1. Division of Phytological Research,
2. Division of Agricultural Extension,
3. Division of Plant Sanitation,
4. Division of Plant Propagation Stations,
5. Division of Special Projects,
6. Agricultural Economics Division,
7. Crop Statistics and Publications Division,
8. Administrative Division.

A study of the problems concerned with the investigation of soil and climatic conditions and the methods of producing and handling agricultural products; the introduction, production, and distribution of improved seeds and plants; the establishment, equipment, maintenance, operation, and administration of seed farms for staple crops; the control and eradication of diseases, insects and other pests injurious to economic plants; and the promotion and development of the agricultural resources of the Philippines, convinced us that it was possible to carry out these functions and activities through a number of divisions smaller than those existing at the beginning of the year. Consequently, the Bureau of Plant Industry was reorganized, the number of divisions reduced, and all functions and activities reassigned to the following functional divisions:

1. Phytological Research Division,
2. Agricultural Extension Division,
3. Plant Sanitation Division,
4. Division of Plant Propagation.

The Agricultural Economic Division was abolished and its functions and activities were transferred to and consolidated with another division of the Bureau of Commerce. Likewise, the Crop Statistics and Publications Division was abolished and its functions and activities, together with similar functions and activities of other units of the Department, were transferred and consolidated to form the Division of Statistics and the Division of Publications, both under the direct supervision of the Secretary of Agriculture and Commerce.

The Division of Special Projects and the Administrative Division were both abolished and such of their functions and activities as did not properly belong to the functional divisions were transferred to the Office of the Director, under the immediate general supervision of the Director of Plant Industry.

The reorganization of the Bureau of Plant Industry was carried out pursuant to Memorandum Order No. 28 dated May 31, 1933, and effective June 1, 1933.

On January 1, 1933, the following were the divisions of the Bureau of Animal Industry:

1. Veterinary Research Division,
2. Animal Disease Control Division,
3. Animal Husbandry Division,
4. Division of Animal Statistics and Publications,
5. Administrative Division.

The improvement of the methods of reproduction and care of domestic animals; inquiry into, and the determination of, the means for the prevention and cure of dangerous communicable diseases affecting such animals; and in general the promotion of the livestock industry of the Philippines, required a rearrangement in the Bureau of Animal Industry into the following functional divisions:

1. Veterinary Research Division,
2. Animal Disease Control Division,
3. Animal Husbandry Division,
4. Animal Products Division.

The Division of Animal Statistics and Publications was abolished and its functions and activities were transferred and consolidated, together with those of other bureaus of the Department, into the Division of Statistics and the Division of Publications, both under the direct supervision of the Secretary of Agriculture and Commerce.

The Administrative Division was abolished and most of its functions and activities were transferred to the Office of the Director as in the case of other bureaus of the Department. A new division was organized,—the Animal Products Division—which promotes industries that depend upon the conservation and manufacture of food products derived from the livestock industry.

The reorganization of the Bureau of Animal Industry was carried out pursuant to Memorandum Order No. 29 dated May 31, 1933, and effective June 1, 1933.

The Fiber Standardization Board was abolished by the Reorganization Law of 1932 and all its functions and activities were transferred to the Department of Agriculture and Commerce. As the fibers of economic value constitute a very important product of the Philippines, it was necessary to organize an administrative unit, which has been designated as the Fiber Inspection Service, for the enforcement of the provisions of law concerning commercial fibers.

The Division of Home Economics was organized to coördinate the home extension work of the Bureau of Plant Industry, the Bureau of Animal Industry, and the Bureau of Science concerning food preparation.

The Food Preservation Division of the Bureau of Science was abolished to prevent duplication with the work of the Bureau of Plant Industry and the Bureau of Animal Industry with respect to the economic utilization of plant and animal products

respectively. The new division carries out home extension work necessary in order to bring to the home the benefits of scientific research and technical ability in the preparation of foods and other activities for the improvement of home life among the masses.

All matters pertaining to accounting and property which heretofore had been handled in each bureau by accounting and property divisions or sections, have been consolidated to form the new Division of Accounts and Property, references to which have been made already in connection with the different bureaus which were reorganized. In a similar way and under identical principles, the Division of Statistics, the Scientific Library Division, and the Division of Publications have been organized, all of which, together with the Office of the Secretary, have been grouped together and designated in the scheme of reorganization of the Department of Agriculture and Commerce as the General Service group, for the reason that these units are common to all other Bureaus and Department functional divisions, which are grouped under Natural Resources, Commercial and Industrial Promotion, and Agricultural Industries.

The Department functional divisions are the following:

1. Division of Accounts and Property,
2. Division of Statistics,
3. Scientific Library Division,
4. Division of Publications,
5. Division of Mineral Resources,
6. Fish and Game Administration,
7. Division of Navigation,
8. Fiber Inspection Service,
9. Division of Home Economics.

Activities which do not properly belong to any of the foregoing Department functional divisions or to the different bureaus, have all been transferred to the Office of the Secretary, in a similar manner that such activities have been transferred to the Office of the Director in each bureau.

By the reorganization thus effected, it has been possible to coördinate the various services which the Department is called upon to render to the people, in such a way that without impairment of efficiency such services may continue to be rendered within the greatly reduced appropriations which the Philippine Legislature authorized for the Department of Agriculture and Commerce for 1933, as compared with the amount authorized



* Abolished Divisions, whose functions and activities were consolidated with other Divisions.

Chart 1. ORGANIZATION OF THE DEPARTMENT OF AGRICULTURE AND COMMERCE, JANUARY 1, 1933

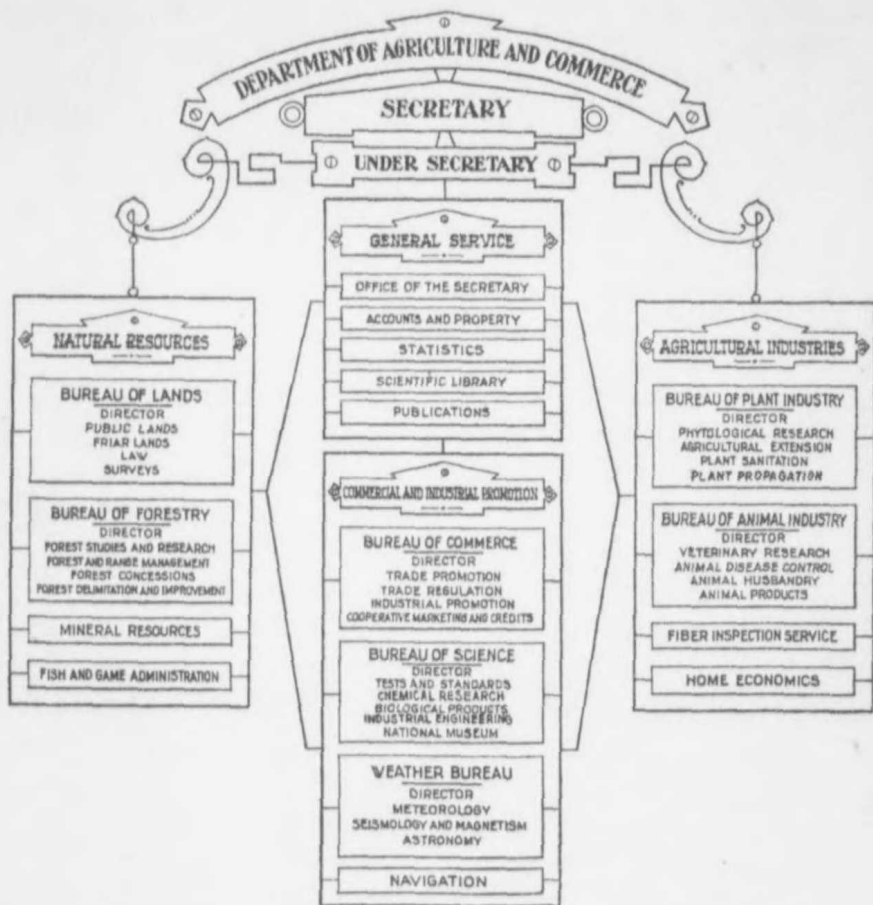


Chart 2. REORGANIZATION OF THE DEPARTMENT OF AGRICULTURE AND COMMERCE, JUNE 1, 1933

for the Department of Agriculture and Natural Resources for 1932. This difference or reduction amounts to ₱1,500,000 approximately. Furthermore, by the reorganization, greater economies will result later through the simplification, and systematization which will be carried out in all functional divisions of the bureaus of the Department.

The provisions of the different memorandum orders reorganizing the bureaus and offices of the Department were embodied in a general administrative order numbered 1 and issued July 19, 1933.

V. RECOMMENDATIONS

1. BUREAU OF PLANT INDUSTRY

The fumigation house for the use of the Cebu Plant Propagation office is urgently needed to enable that station to handle the inspection more effectively and to facilitate the fumigation of large quantities of corn and other plant materials imported from the port of Cebu.

In order to enable the development and improvement of the Los Baños Economic Garden on a large scale, steps should be taken towards the permanent transfer at an early date of that portion of the Camp Eldridge Military Reservation now occupied by said Garden. Arrangements with the United States army authorities should be made towards this end.

A law should be enacted requiring the provincial board of a province where the official station of a district agronomist is established, to provide said district agronomist with suitable space in the provincial capitol or in any other provincial building and to furnish him with the necessary furniture, equipment, office supplies, clerical assistance, and janitor service.

Those portions or sections of the Administrative Code regarding the power of eminent domain of provincial boards and municipal councils should be amended so as to include the acquisition of lands for seed farms, public nurseries, and experimental or demonstration plots in order to promote and encourage the agricultural industry of the province.

2. BUREAU OF ANIMAL INDUSTRY

It is planned to exert final efforts towards the complete eradication of rinderpest, an objective which has long been delayed on account of lack of men and facilities.

It is recommended that the proposed legislation submitted in the last Legislature amending section 1765 (f) of the Administrative Code relative to the power of the Director of Animal Industry over the establishment, maintenance, supervision, and control of slaughterhouses and milk inspection system, be enacted into law.

Appointment of a veterinarian to the Council of Hygiene is also recommended.

3. BUREAU OF FORESTRY

With a view to promoting efficiency in the classification and disposition of public lands, it is contemplated to work out an effective system of coöperation between the Bureau of Lands and the Bureau of Forestry. It is proposed that annual plans be prepared jointly in advance by the two bureaus, and the necessary funds allotted for the different work on reconnaissance, delimitation, classification, certification, and subdivision for final survey of each project. In this manner it is hoped that the present piece-meal system of individual inspection of public land application would be gradually done away with.

Constant supervision by forest officers is necessary in the preparation of timber invoices of licensees, so as to prevent leakage of government revenue in the form of forest charges. It is hoped to make this effective in the future, but it calls for additional scalers to carry out the enforcement of the forest laws and regulations.

It is recommended that adequate protection of cut-over areas in absolute forest lands from fires and cañgins be provided in order that the young vegetation may be given a chance to reach maturity. This may be done by increasing the penalty of violators of the cañgin law and by providing additional personnel for patrol work.

4. BUREAU OF LANDS

The long-planned construction of a Bureau of Lands building on Wallace Field at the corner of San Luis and General Luna Streets should be carried out. This is necessary in order to protect valuable records against fire, the quarters occupied by the Bureau of Lands being a veritable fire trap. A new building is necessary also because of the limited office space in the present quarters.

Homeseekers should be sent only to approved points of destination. This is necessary to enable the Bureau of Lands to readily allocate agricultural public lands, which have been subdivided or investigated, to homeseekers upon their arrival in their destination. While the Bureau of Lands has always insisted on designated points of destination, the Bureau of Labor always recommends exceptions for various reasons and it often happens that the homeseekers do not readily find vacant agricultural public lands available for immediate occupation.

As fast as resources permit, more vacant public lands available for disposition should be subdivided. Once the boundary

survey is completed, compulsory registration proceedings should be started immediately in order that the status of the land can be definitely determined before the lots are thrown open to prospective homeseekers.

Existing laws should be amended to compel free patent applicants to pay for survey charges to obviate difficulties in the collection of cadastral costs from free-patent applicants. It is believed that the free-patent provisions of the Public Land Act are now obsolete. Free-patent applications are expensive and the Government does not obtain any returns whatsoever. Many persons who could have perfected their titles under Chapter 8 of the Public Land Act resort to the free-patent provisions in order to avoid expense.

The Bureau of Lands should be allowed to proceed with new cadastral projects as fast as existing projects are completed so as not to disband any survey party engaged in cadastral work. Cadastral surveys are necessary to settle boundary disputes, to give people titles to their lands economically, to increase land taxes, and to facilitate the administration of the public domain.

5. BUREAU OF COMMERCE

It is intended to devote more attention to the promotion and development of Philippine export trade. To this end it is recommended that the position of trade commissioner in the Far East and in Europe be filled as soon as possible.

In order to give due protection to the public against questionable and illegal practices or manipulations of corporations that may be organized, the Corporation Law should be amended so as to give the Bureau of Commerce more specific powers of regulation and investigation into the assets, operating methods, and activities of prospective new corporations, and the discretionary power to grant or deny their applications for registration in the mercantile registry as the results of such inquiry by the Bureau will warrant.

The Trade-Marks Law, Act No. 666, should be amended, to require the publication of trade-marks and trade names in the Official Gazette for ten consecutive weeks before they are registered in the Bureau of Commerce.

The Corporation Law should be amended to require all registered corporations to submit to the Bureau of Commerce the statements of their assets and liabilities within the first fifteen days of each year.

It is proposed to establish during 1934 a sugar exchange, rice exchange, copra exchange, hemp exchange, and tobacco exchange that will open for business on certain designated days each week to enable the producers and dealers in these basic commodities to meet and transact business with convenience and facility.

The organization in the provinces of various industrial centers for the purpose of establishing new permanent industries in sections of the country where conditions are favorable, is contemplated.

6. BUREAU OF SCIENCE

In order to promote efficiency in the investigations and experiments for the promotion of science and for the development of industries in the Philippine Islands, the standardization of salaries of personnel, the replacement of worn-out apparatus, and the acquisition of new apparatus, are necessary.

In view of the extensive use by the Bureau of Health of vaccines and other biologic products prepared by the Bureau of Science in the control and prevention of infectious diseases, especially cholera, typhoid, dysentery, and smallpox, it is imperative that detailed studies of such products be made from year to year for the purpose of improving their potency and keeping qualities, eliminating the undesirable reactions which they sometimes produce, and reducing the cost of their production. For this reason, work along the following lines of investigation is contemplated; the preparation of anti-dysenteric serum by the use of formalized dysentery organisms, the purification of anti-dysenteric serum, the safety and antigenic properties of bacterial vaccines prepared without heating, the antigenic properties of bacteriophage lysates, determination of the keeping qualities of vaccines and sera under Philippine conditions, and improvement of the present methods of the preparation of smallpox vaccine.

Epidemiological studies on cholera should be made in the City of Manila and in the provinces for the purpose of inquiring into the contributing factors on the incidence of this disease in the Philippines. As a start, a survey of the public midden sheds in Manila and immediate vicinities should be made for the presence of the cholera vibrio.

In view of the importance of the human blood fluke (*Schistosoma japonicum*) as a menace to the public health, and in view

of its reported endemicity in certain parts of the Islands, the following lines of investigation are expected to be carried out: a thorough survey to determine the distribution of the parasite in the Philippines and the factor responsible for its distribution, and the development of preventive measures with special reference to the control of the molluscan intermediate host parasites.

7. WEATHER BUREAU

Dependent upon increased means and facilities, the Weather Bureau contemplates the investigation of the following problems: Study of the upper air by means of pilot balloon observations and meteorographs; inquiry into the types of air masses and fronts in the Far East; a thorough study of the deep-focus earthquake of Mindanao on April 8, 1929; relation between microseisms and typhoons; and connection between earthquake epicenters and geological fault lines in the Philippines.

It is planned to introduce the system of storm signals adopted at the Hongkong Conference, and to install electric sirens in Manila for conveying typhoon signals to the public. It is intended to prepare and publish windroses for each of the Philippine Airways Systems, to revise and publish the data secured in the Philippines during the International Polar Year, August, 1932 to September, 1933, and to publish all the rainfall data secured since the establishment of each weather station in the Islands. It is likewise intended to prepare charts showing the path of typhoons by months, as well as an orographic weather map.

8. FISH AND GAME ADMINISTRATION

In order to carry on its work efficiently, the Government Experimental Fish Farm at Hinigaran, Occidental Negros, should be provided with increased equipment. It is hoped to secure a small motor boat, dissecting microscopes, glasswares, thermometers, and plankton nets. The Fish and Game Administration also plans to build additional terraria and vivaria in the Manila Aquarium. The Fish Preservation Station at Estancia, Iloilo, should be reestablished.

9. DIVISION OF MINERAL RESOURCES

In view of the increased activity in the mining industry resulting in the filing of numerous claims for record and the probability of conflicts of locations, it would be to the interest of the Government as well as the mining public to transfer the functions of the mining recorder, now performed by the secre-

tary of the provincial board, to the provincial treasurer. The provincial treasurer is more or less permanent and usually has better facilities than the provincial secretary who is generally changed after each election. It would facilitate the work of the Division if the present mining records of the district were regrouped in order to allow prospectors to register their mining claims in the office of the mining recorder more accessible to them. This regrouping of districts should be done gradually as necessity arises.

The Division hopes to conduct a more detailed study of geology and mineral resources of the Philippines in order to extend better aid to those interested in or connected with the development of the mining industry. This, of course, is dependent upon increased facilities, which in turn are dependent upon a greater outlay. It is hoped to devote special attention to the geology of gold and chromite and the investigation of clay deposits. With an increase in personnel, a systematic geologic and topographical survey is likewise contemplated.

10. DIVISION OF HOME ECONOMICS

It is the aim of the Division to help solve the economic problems of the country by the proper introduction of economical and well-balanced diets, the utilization of waste and native products, and profitable use of spare hours.

Women's and children's clubs will be organized in every town, city, or barrio, and efficient housekeeping, home making, and similar activities introduced through these clubs.

Proper house building and furnishing, interior decoration, good food habits, utilization of lawns, spare hours, waste materials, and left-overs, etc., will be dealt with in demonstrations.

It is the plan of the Division of Home Economics to urge public officials to give it all due coöperation and support. Provincial governors will be requested to appoint two demonstrators on home management and good housekeeping in their respective communities. These demonstrators will work under the direct supervision of the Division. They will do follow-up work on the different activities introduced by the home office.

11. DIVISION OF NAVIGATION

If funds are available, and in accordance with the recommendation of the Lighthouse Board, new lighthouses will be constructed in the following places: Cabeza de Tablas, Romblon; Looc, Romblon; Misamis, Occidental Misamis; Baliguian, Panay;

Osmeña Fountain, Cebu; and Manila Harbor. These projects call for an outlay of ₱82,000. The Division also proposes numerous repair projects for which a total appropriation of ₱45,500 is needed.

Other plans and recommendations for future work which involve financial legislation are embodied in the chapter entitled "Financial Statement" under the heading "Financial Recommendations."

Respectfully submitted.

George B. Dargatzis
Acting Secretary



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